United States
Department of
Agriculture

Soil
Conservation
Service

In cooperation with
University of Florida,
Institute of Food and
Agricultural Sciences,
Agricultural Experiment Stations
and Soil Science Department,
and Florida Department of
Agriculture and
Consumer Services

Soil Survey of Seminole County, Florida

How To Use This Soil Survey

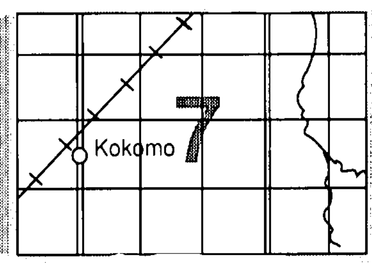
General Soil Map

The general soil map, which is the color map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

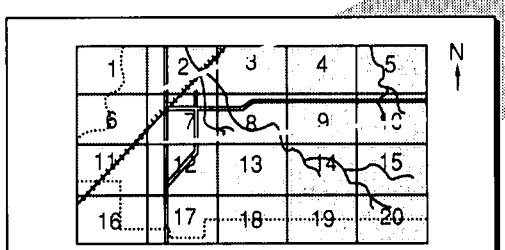
Detailed Soil Maps

The detailed soil maps follow the general soil map. These maps can be useful in planning the use and management of small areas.



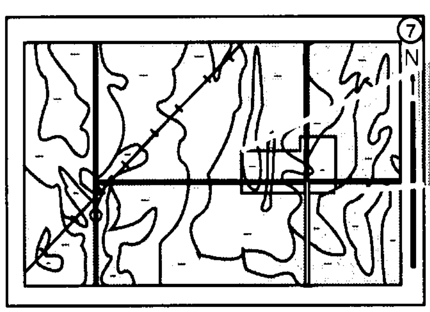
MAP SHEET

To find information about your area of interest, locate that area on the **Index to Map Sheets**, which precedes the soil maps. Note the number of the map sheet, and turn to that sheet.



INDEX TO MAP SHEETS

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Index to Map Units** (see Contents), which lists the map units by symbol and name and shows the page where each map unit is described.



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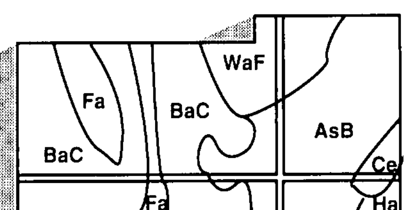


AREA OF INTEREST

NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

The **Summary of Tables** shows which table has data on a specific land use for each detailed soil map unit. See **Contents** for sections of this publication that may address your specific needs.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the Agricultural Experiment Stations, and local agencies. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1963. Soil names and descriptions were approved in 1986. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1987. This soil survey was made cooperatively by the Soil Conservation Service and the University of Florida, Institute of Food and Agricultural Sciences, Agricultural Experiment Stations and Soil Science Department, and Florida Department of Agriculture and Consumer Services. It is part of the technical assistance furnished to the Seminole County Soil and Water Conservation District. The Seminole County Board of Commissioners contributed financially to the acceleration of the survey.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

This survey supercedes the Seminole County, Florida, soil survey published in 1966 *(13)*.

All programs and services of the Soil Conservation Service are offered on a nondiscriminatory basis without regard to race, color, national origin, religion, sex, age, marital status, or handicap.

Cover: High quality recreational developments, such as this golf course in an area of Astatula-Apopka fine sands, 0 to 5 percent slopes, serve a rapidly expanding urban and suburban population in Seminole County.

Contents

Soil Series

Issued March 1990

Index to Map Units

Summary of Tables

Foreword

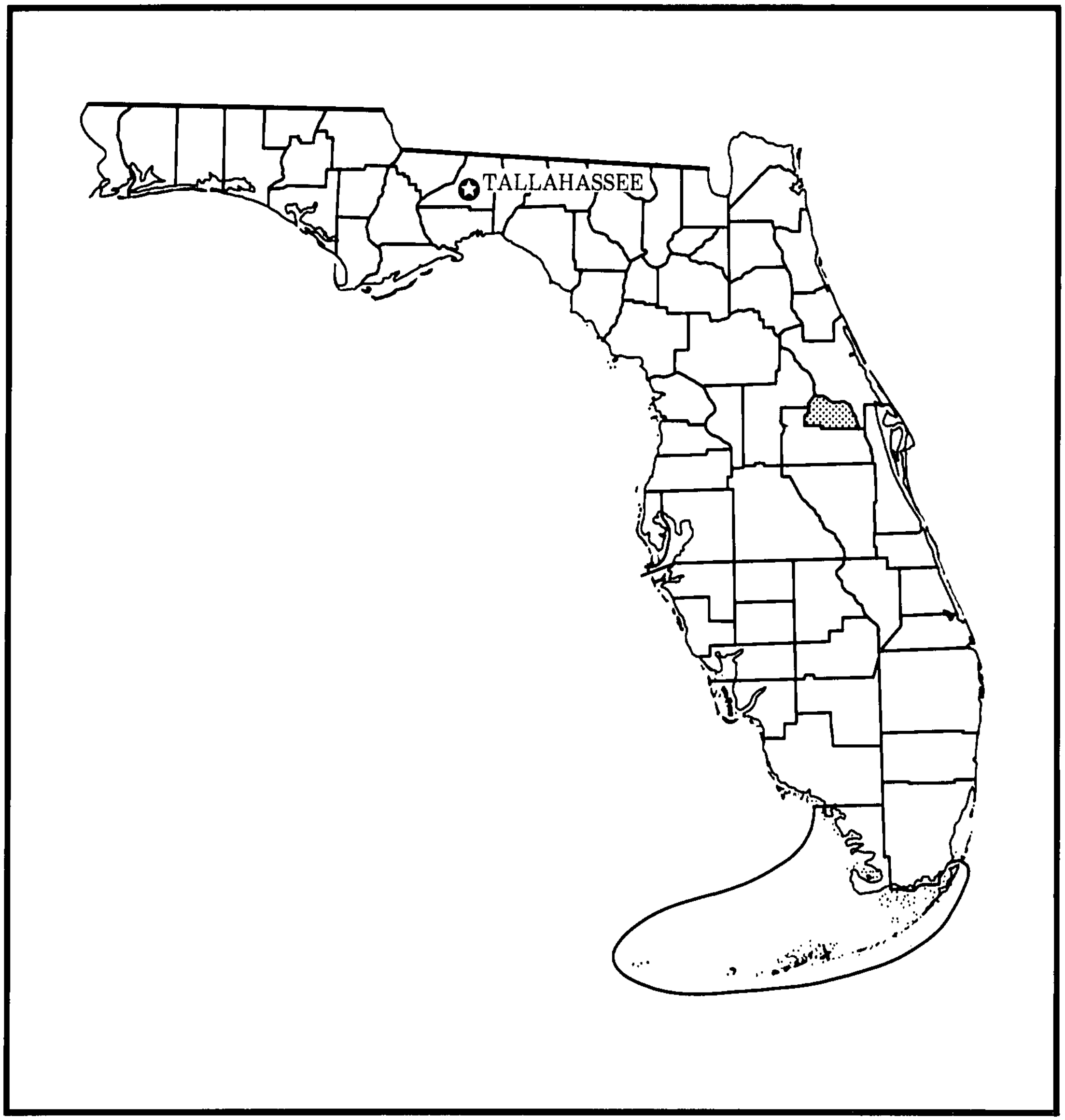
This soil survey contains information that can be used in land-planning programs in Seminole County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, ranchers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to insure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are saline. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Soil Conservation Service or the Cooperative Extension Service.

James W. Mitchell
State Conservationist
Soil Conservation Service



Location of Seminole County in Florida.

Soil Survey
Seminole County, Florida

By Gregg W. Schellentrager and G. Wade Hurt,
Soil Conservation Service

Soils surveyed by Albert L. Furman and Horace O. White,
Soil Conservation Service

Soils recorrelated by Gregg W. Schellentrager, G. Wade Hurt,
and DeWayne Williams, Soil Conservation Service

United States Department of Agriculture, Soil Conservation Service
In cooperation with
University of Florida, Institute of Food and Agricultural Sciences,
Agricultural Experiment Stations and Soil Science Department,
Florida Department of Agriculture and Consumer Services,
Seminole County Soil and Water Conservation District,
and Seminole County Board of Commissioners

SEMINOLE COUNTY is in the east-central part of the peninsular Florida. It is bounded on the north by the St. Johns River, which separates the county from Volusia County; on the west by the Wekiva River, which separates the county from Lake County; and on the south by Orange County. Sanford, the county seat, is on the southern shore of Lake Monroe in the north-central part of the county.

The total land area, including water bodies of less than 40 acres, is 298 square miles or 190,739 acres. In addition, approximately 30,145 acres is covered by the water of many lakes or bodies of water of more than 40 acres in size.

General Nature of the County

In this section, environmental and cultural factors that affect the use and management of soils in Seminole County are discussed. These factors are climate; physiography, geology, and ground water; history and development; natural resources; farming; transportation; and recreation.

Climate

The climate of Seminole County is characterized by long, warm, somewhat humid summers and by mild, dry winters with short, occasional freezing periods. The average annual rainfall, according to U. S. Weather Service records, is about 51 inches, and it is seasonally distributed with about 60 percent falling from June through September (table 1) and about 40 percent falling when cold fronts move across the State.

Air from the Atlantic Ocean, the Gulf of Mexico, and the numerous lakes in the county has a moderating effect on the temperature in both winter and summer. The average daily maximum temperature in summer is between 91 and 92 degrees Fahrenheit with the average daily minimum temperature between 71 and 72 degrees. Once or twice a year, the temperature may reach 100 degrees or higher. The average daily maximum temperature in the winter is about 72 degrees, and the average minimum temperature is about 50 degrees. The highest temperature on most days is between 65 and 80 degrees, and the lowest temperature is between 40 and 60 degrees.

Some of the cold spells in winter bring freezing temperatures and frost. The agricultural areas in the colder parts of the county can expect freezing temperature and frost at least once each winter. In an average winter, freezing temperatures and frost occur on about 8 days, and the temperature drops to 28 degrees Fahrenheit or lower at least two or three times in most areas that are used for agriculture. Temperatures of 20 degrees or lower are rare; however, records indicate that temperatures lower than 20 degrees occur in the colder areas on an average of about 1 year out of 10. Cold spells generally last for about 2 or 3 days *(16)*.

In this county, precipitation for any month varies greatly from year to year. Generally, more than half the total annual precipitation that falls during the summer rainy season of June through September is associated with tropical storms or depressions. In some years, more precipitation occurs in March and in early April than the normal average rainfall records indicate. On the average, November through February is considered the dry season. However, in some years, it is droughty from the middle of April to the middle of May. Nearly all precipitation in this county falls as rain. Hail falls occasionally in the spring and early in the summer, almost always during a thunderstorm. Snowflakes have been reported, but they usually melt as they fall.

Prevailing winds in this area are generally southerly in spring and summer and northerly in fall and winter. Windspeed by day is usually 8 to 15 miles per hour and drops below 8 miles per hour at night.

Physiography, Geology, and Ground Water

R. A. Johnson, geologist, Department of Natural Resources, Florida Geological Survey, Bureau of Geology, prepared this section.

Physiography

Seminole County is located in the central or midpeninsular zone of Florida *(18)*. It consists of alternating ridges and valleys with abundant lakes located on both landforms. Fig. 1 shows the principal physiographic features of the county.

The Osceola Plain is a broad, flat area of low, local relief and is generally between 60 and 70 feet in elevation. Most of the western part of the county is made up of this plain. The Orlando Ridge is an area of higher elevation that is generally parallel to the other surrounding ridges outside of Seminole County, such as the Mount Dora Ridge to the west. It is possible that the Orlando Ridge once was a part of a relic, "Cape Orlando," which resulted from progressive progradation that formed Cape Canaveral and False Cape in Brevard County from marine processes. The northern tip of the Orlando Ridge extends a few miles into Seminole County in the area of Altamonte Springs.

The Eastern Valley is generally 20 to 25 feet in elevation and is characterized by a broad, flat area through which the St. Johns River flows. Most of the eastern part of Seminole County is composed of this valley.

The Wekiva Plain is a flat area in western Seminole County dominated by the Wekiva River. In eastern Seminole County, the Geneva Hill is a higher area in the Eastern Valley in the vicinity of Geneva.

Geology

Seminole County is underlain by a thick sequence of limestone and dolostones upon which a relatively thin section of clastics (sand, silt, shell material, and clay) was deposited *(3)*. This discussion will consider only those geologic formations that are normally encountered in drilling water wells in the county. Fig. 2 shows the west to northeast and south to north cross-sections based on well log information across Seminole County.

The deepest formation normally encountered is the Avon Park Limestone Formation of Middle Eocene age. It consists mostly of hard, brown dolostone and some tan, granular limestone. Generally, the lower half of the formation is hard dolostone, which contains many caverns and fractures. The upper half consists of cream to tan, granular limestone interbedded with very fine-grained, hard to soft dolostone. The limestone is composed of a mixture of very small, cone-shaped microfossils that are usually loose to poorly cemented or friable. In Seminole County, the Avon Park Limestone Formation is approximately 300 to 350 feet thick.

The Avon Park Limestone Formation is the first limestone formation encountered in some wells in the vicinity of Geneva in northeast Seminole County. Here, the overlying Ocala Limestone Formation is missing.

The Ocala Limestone Formation of late Eocene age is underlain by the Avon Park Limestone Formation. It consists of a loose to moderately well cemented mass of very small to large microfossils with much less dolostone when compared to the Avon Park Limestone. Typically, the Ocala Limestone contains almost pure limestone with no dolostone, although the lower few feet can be partly dolomitized in some areas. The Ocala Limestone is missing in some areas around Geneva. The thickness of the formation is between 0 and 130 feet.

Overlying the Ocala Limestone is the Hawthorn Group of Miocene age, which consists of sand, silt, and clay and some limestone or dolostone beds. Black to amber grains of phosphate are very common and are intermixed throughout the lithologies mentioned above. In addition, these lithologies are typically intermixed with each other. Very few pure, one-lithology beds are in the Hawthorn Group.

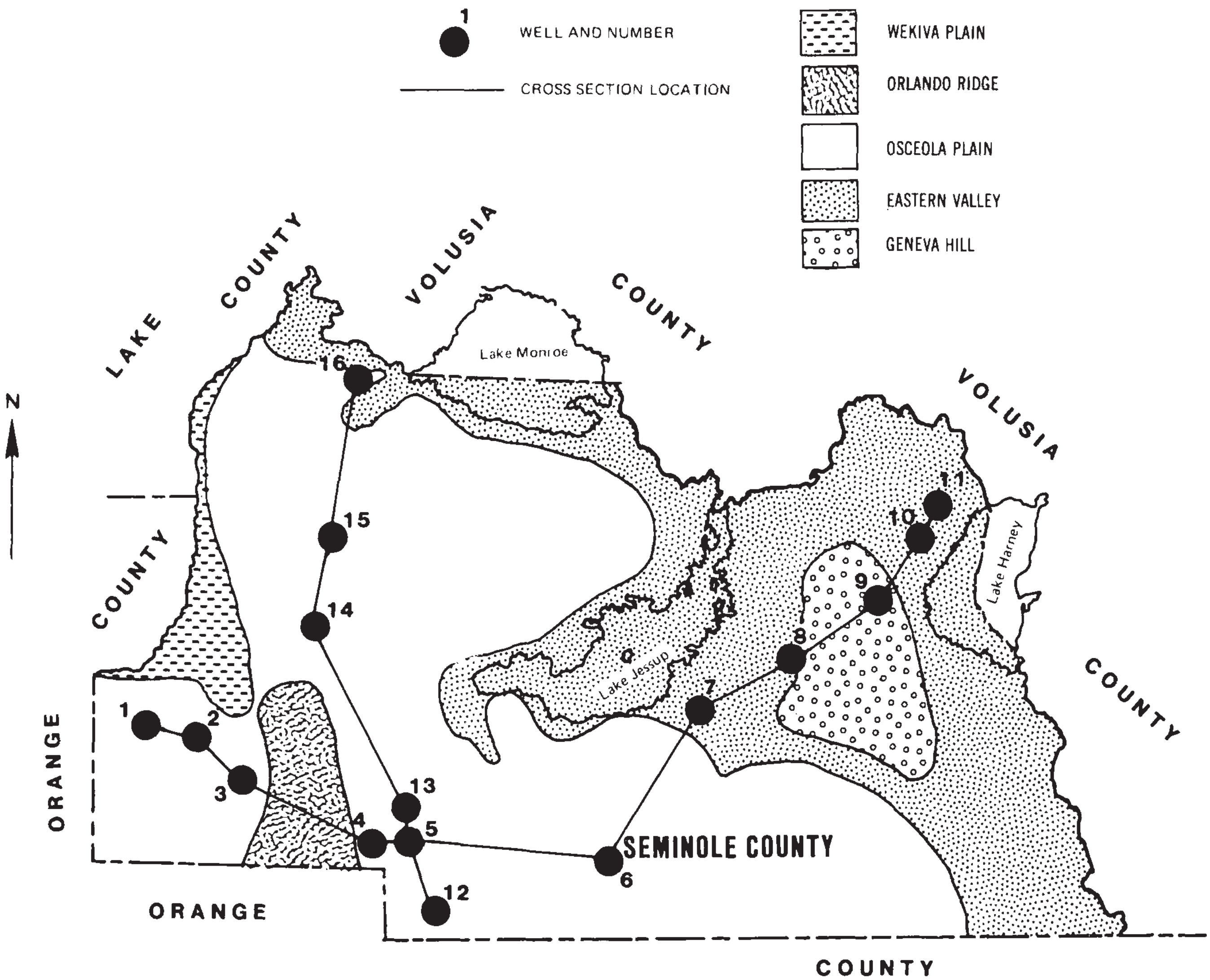
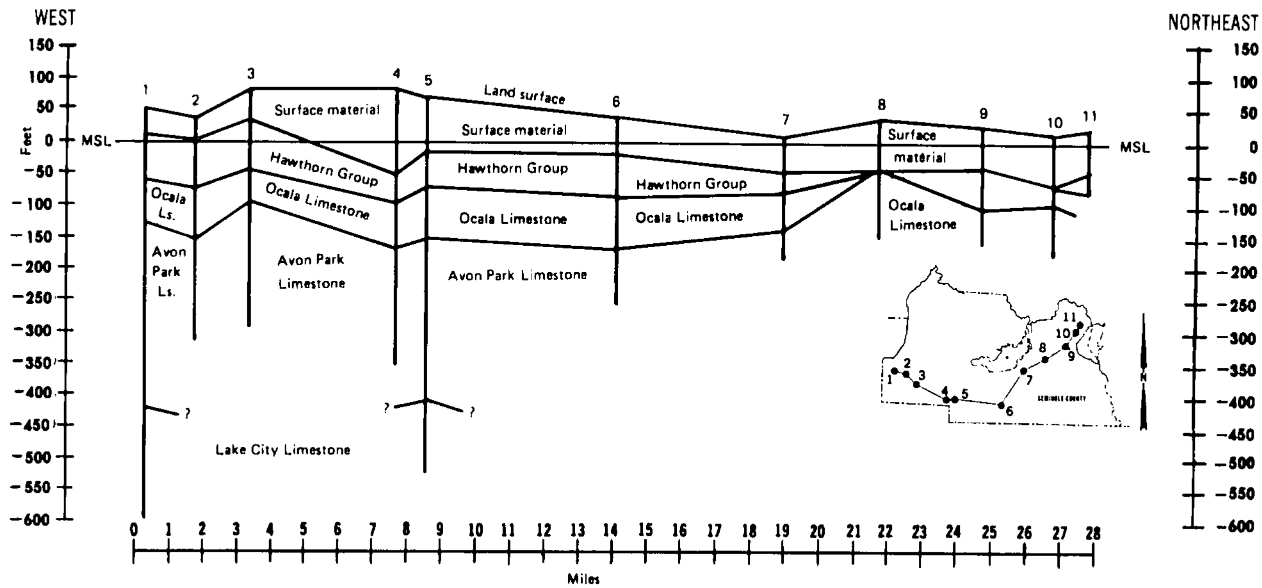
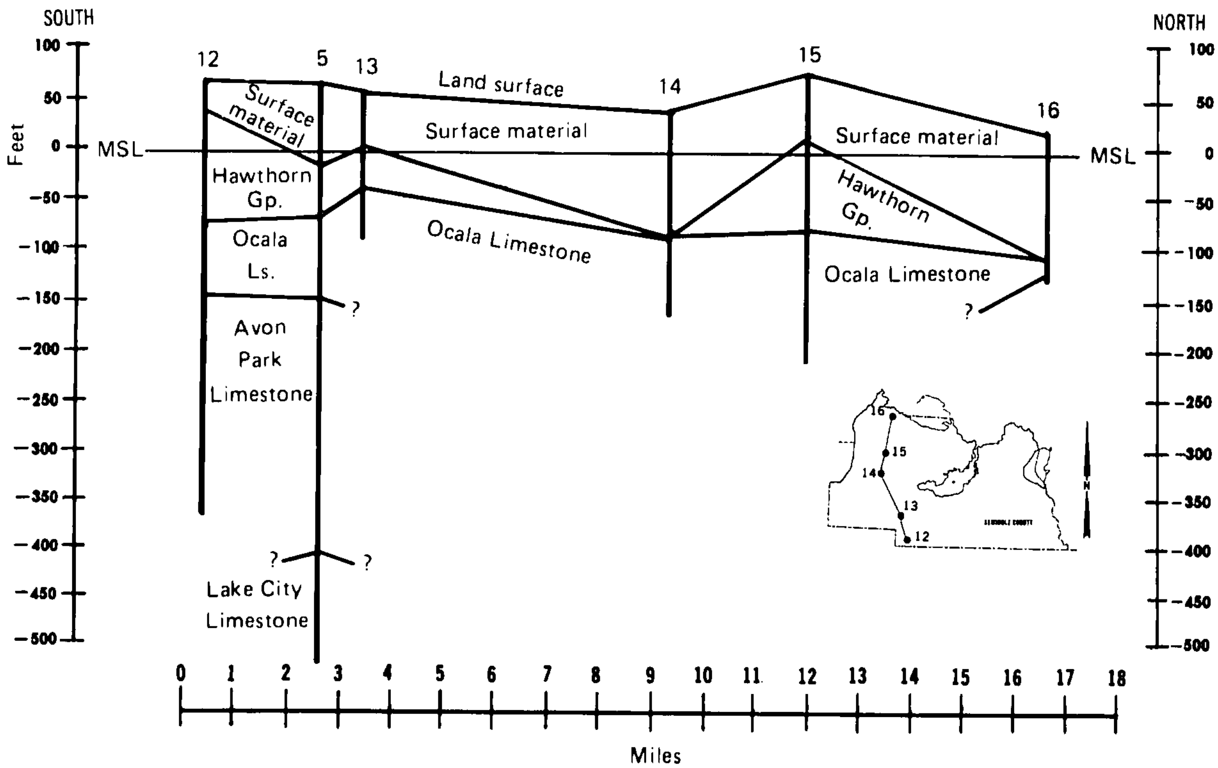


Figure 1.—Physiographic features and location of cross sections of the geologic formations of Seminole County, Florida, and the surrounding areas.

The thickness of the Hawthorn Group is between 0 and 130 feet. It is absent north of a line passing east-southeast to west-northwest across the county from a point just south of where Florida State Highway 46 intersects the Volusia County-Seminole County line through Lake Jessup to the intersection of Florida State Highway 46 and the Wekiva River (fig. 3). North of this line, the limestone and dolostone section is overlain by the generally nonphosphatic clastic material, which is younger than the Hawthorn Group.

The clastic material overlying the Hawthorn Group consists of sand, clay, and shell material. Generally, sandy or clayey shell material directly overlies the Hawthorn Group with clayey sand overlying that material and relatively pure sand extending from there to the surface. In the north part of the county, the sandy or clayey shell material directly overlies the Ocala and Avon Park Limestones. In some areas, mainly to the west and south in the county, the shelly material is absent. In the past, these deposits have been given different formational names. Not enough information is available and the deposits have not been studied adequately to formally name them. They are referred to in this report as undifferentiated surficial clastics. Age probably ranges


WEST
NORTHEAST
Feet
MSL
Land surface
Surface material
Hawthorn Group
Ocala Limestone
Ocala Ls.
Avon Park Ls.
Avon Park Limestone
Lake City Limestone
Ocala Limestone
Miles
SEMINOLE COUNTY


SOUTH
NORTH
Feet
MSL
Land surface
Surface material
Hawthorn Gp.
Ocala Ls.
Ocala Limestone
Avon Park Limestone
Lake City Limestone
Miles
SEMINOLE COUNTY

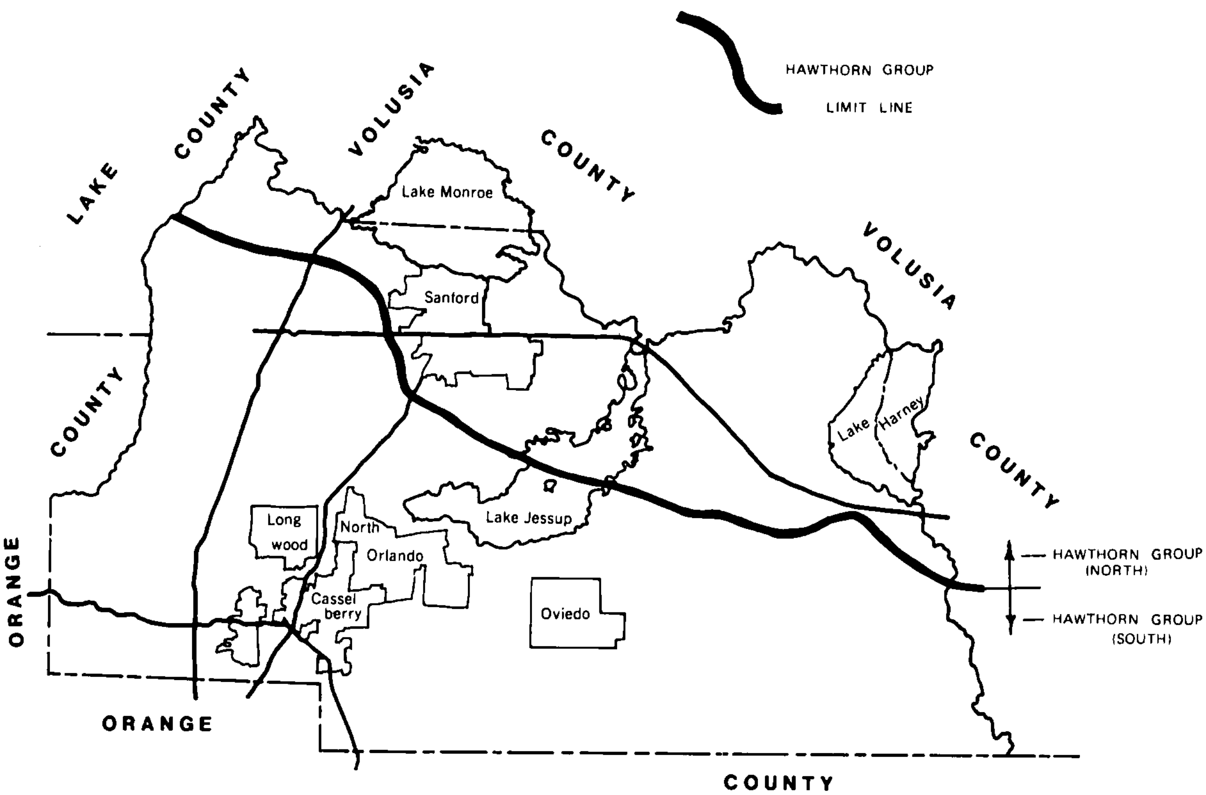


Figure 3.—Location map of the Hawthorn Group in Seminole County, Florida.

between Miocene and Pleistocene. In the past and in other areas of the State, the shell material has been referred to as the Callosahatchee Formation or the Nashua Formation, and the sand above has been referred to as the Citronelle Formation. The sand at the surface has been termed Pleistocene terrace deposits.

The thickness of these undifferentiated surficial clastics ranges from 30 to 150 feet. Generally, they are thinner toward the southwest in the county.

Structurally, Seminole County is located on the Sanford High. On cross-section 1 to 11 (see fig. 2) the top of the limestone is relatively deep in wells 1 to 6 on the cross-section. In wells 7 to 11, to the northeast in the county, the limestone top is much closer to the surface and one or more of the formations overlying the limestone to the south pinch out or become perceptibly thinner to the north.

Soil suitability for various uses is normally based on evaluations of properties within the soil alone. Interpretations in this soil survey are made as to what effects these properties could have on use. Many geologic features are not expressed within the soil but may significantly affect the suitability of a site for a particular use. Individual sites should be evaluated by onsite examination and testing. In many cases, special planning, design, and construction techniques can be used to overcome geologic problems where they are identified and evaluated.

Ground Water

Most large diameter wells in Seminole County obtain water from the Avon Park Limestone Formation. The lower part of the formation contains abundant caverns and fractures, and this porosity is filled with copious quantities of water. Because of its granular nature and poor cementation, water can also be obtained from wells penetrating the upper part of the Avon Park Limestone. The water occupies the intergranular spaces in the rock.

Where the very fine-grained, soft dolostone is dominant in the upper zone of the Avon Park Limestone not much water can be obtained.

The Ocala Limestone Formation, also because of its granular nature and relatively low cement content, is tapped by many wells in the county and provides an adequate quantity of water. Because the Ocala Limestone is not present everywhere in Seminole County and is relatively thinner, the Avon Park Limestone remains the most used source of ground water. Generally adequate water supply is available if salt water intrusion has not impacted the water supply.

The Hawthorn Group (clastics) acts as a barrier or seal on top of the limestone section and causes the water in the limestone section, called the Floridan Aquifer, to be under pressure (artesian). In low-lying areas along the St. Johns River, this pressure causes ground water to flow from wells.

The Hawthorn Group also contains limestone, sand, or dolostone beds in some areas that contain and will yield water to wells. This source, called the Intermediate Aquifer, is not used extensively in Seminole County.

Small diameter wells, which penetrate the undifferentiated surficial material above the Hawthorn Group, can obtain small quantities of water from these beds and are generally for private supply or other noncommercial uses. This water source is called the Surficial Aquifer. However, water from this source frequently contains high concentrations of iron or even salt. The salt water intrusion in these surficial beds generally is of the lateral type that originates from free-flowing, abandoned, deeper wells, from water from the St. Johns River or from salt springs, or from other more localized sources. Where the deeper aquifers are already salt contaminated, the Surficial Aquifer can contain water of better quality if no local sources of contamination can degrade the water quality.

History and Development

In 1913, the State legislature created Seminole County from the northeastern third of Orange County. On April 25, 1913, Sanford became the county seat.

According to the 1920 census, Seminole County had a population of 11,086. It was called "the biggest little county in Florida." Sanford had a population of 5,588.

During the 1920 and 1930 prosperity years, Seminole County began to grow but not as fast as other parts of Florida. Sanford got a new City Hall and library, and other improvements, such as roads and streets, were made.

In 1926, a hurricane struck and an already declining economy collapsed further. The rush to get out of Florida increased as the economy of the county collapsed.

Seminole County began to bustle again after 1940. During World War II, Sanford became a center of military activity when the Sanford Naval Air Station opened. Prosperity continued after the war, and many of those who had resided in the area during wartime returned to establish permanent homes and become part of the business community.

The area was starting to steadily grow, and in 1955, the impact of the United States Missile Test Center at the Cape was creating an economic boom comparable to that of the 1920's *(7)*.

In 1970, Seminole County got another economic boost with the Disney World development in South Orange County. This created pressures at all planning levels—regional, metropolitan, county, and municipal. The major objective was and is to provide a continuing effort to help solve areawide problems of traffic congestion, suburban sprawl, stream pollution, water supply, and recreational needs. The major challenge of planning, now and in the years ahead, is to enhance the quality of local communities and stimulate an efficient and orderly pattern of development through the cooperation of all neighboring cities and counties.

Natural Resources

Seminole County is bounded on the north and east by the St. Johns River and on the west mainly by the Wekiva River (fig. 4). The water in the St. Johns River is brackish. The St. Johns River and connecting chain of lakes are used for navigation, recreation, and sport and commercial fishing. Other streams of importance in the county are the Econlockhatchee River, the Wekiva River, and the Little Wekiva River.

Quantities of freshwater are among the county's most valuable assets. Numerous lakes are in Seminole County, and more than 120 of these are more than 5 acres in size. Most occur in Karst areas on the sand ridges. The water in the lakes is mostly of high quality. Many of the lakes are used for boating and fishing. Springs in the county are the Sanlando Springs, the Miami Springs, and the Wekiva Springs. Wekiva Springs is shared by Orange County. Many other smaller springs are along the Wekiva and Little Wekiva Rivers, and they are used for swimming.

The Floridan Aquifer underlies all of Seminole County. This aquifer supplies at least 95 percent of the freshwater used in the county. The cities use about 60 percent, and the remainder is used to irrigate crops and for other uses. As water use increases, many wells in the eastern part of the county and those near the St. Johns River are becoming more contaminated because of salt intrusion. Recharge to the Floridan Aquifer occurs throughout the county but mainly is in the deep, sandy soils on the upland ridges in the western part of the county.

Most of the soils are sandy and low in natural fertility, but the products of these soils are valuable. The forests are valuable not only for lumber and paper production but also as habitat for many game animals and other

Figure 4.—The Wekiva River forms the dominant part of the western boundary of Seminole County. The river is a major recreational resource. Soils along the banks of the river include Pompano fine sand, occasionally flooded.

wildlife. Many ornamental plants and other plant products are produced here. The climate, scenery, and recreational advantages are valuable resources that attract many visitors to the area.

Farming

Oranges were among the first crops grown by the early settlers. The first orange groves were set out near Sanford between 1840 and 1845. A packing plant had been built by 1869. Many different kinds of seeds and citrus trees and different species of tropical and subtropical fruits and ornamentals were brought into the area for trial plantings by General Sanford. In 1879, General Sanford set out the first citrus groves at St. Gertrude, west of Sanford. Later, these groves were moved to Bel-Air, where drainage was better.

In 1894, a severe freeze halted the growth of the citrus industry, and early in 1895 another severe freeze almost wiped out the groves except for a small area at Bel-Air. Many farmers left the area. The ones who remained looked for other means of earning a livelihood. Dairying was begun, and vegetable seed was brought into the area in an effort to find crops suitable for the climate and soils. Among the vegetables introduced were celery and cabbage, which were well suited to the soils and climate. In the spring of 1898, the first crop of celery was shipped from Sanford, and this crop is still being grown extensively these many years.

Vegetable growing has been successful, mainly, because of the underground irrigation systems that have been used to supply water to the crops. The first attempt to irrigate the soils consisted of using an inverted trough to transport excess water from a large artesian well located in the center of the town of Sanford. The trough allowed part of the water to seep out so that the soil above the trough remained moist during dry periods. When the farmers learned that the soil above the trough remained moist, they began to place other troughs 18 inches deep and 18 feet apart through the fields so that more moisture would be supplied to vegetable crops. The original inverted wooden troughs eventually became obsolete and were replaced by round clay tile and then by plastic pipe.

Since this early start as a center for truck farming, the growing of vegetables for winter market has been among the leading agricultural enterprises in the county. Agriculture continued to expand until sometime in the 1970's when a rapid conversion of arable land to urban uses began. As the population increased, pressure for additional housing also increased and the urban spiral was on. Truck farming is still an important and valuable industry, but it's on the decline. In recent years, watercress acreage has increased to the point of being an important and valuable crop.

Diary farming has declined to only one operation.

Citrus groves have decreased rapidly in recent years because of the freezing weather, disease, and pressures from urban expansion.

Transportation

Seminole County is served by good transportation facilities. Interstate Highway 4 runs through the county and is within a short distance of the major cities. Most other parts of the county are easily reached by other county, State, and Federal highways. The Seaboard Coast Railway runs through the county. Municipal or private airports are available for private or chartered flights.

Recreation

Opportunities for fishing, boating, and swimming are plentiful. Marinas are located along the St. Johns River and associated lakes. Many sports activities, including golf and tennis, are available in most communities. Cultural entertainment is offered by several organizations, schools, and museums. This county also has a zoo.

How This Survey Was Made

This survey was made to provide information about the soils in the survey area. The information includes a description of the soils and their location and a discussion of the suitability, limitations, and management of the soils for specified uses. Soil scientists observed the steepness, length, and shape of slopes; the general pattern of drainage; the kinds of crops and native plants growing on the soils; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material from which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils in the survey area occur in an orderly pattern that is related to the geology, the landforms, relief, climate, and the natural vegetation of the area. Each kind of soil is associated with a particular kind of landscape or with a segment of the landscape. By observing the soils in the survey area and relating their position to specific segments of the landscape, a soil scientist develops a concept, or model, of how the soils were formed. Thus, during mapping, this model enables the soil scientist to predict with considerable accuracy the kind of soil at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, acidity, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. The system of taxonomic classification used in the United States *(14)* is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area are generally collected for laboratory analyses and for engineering tests. Soil scientists interpreted the data from these analyses and tests as well as the field-observed characteristics and the soil properties in terms of expected behavior of the soils under different uses. Interpretations for all of the soils were field tested through observation of the soils in different uses under different levels of management. Some interpretations are modified to fit local conditions, and new interpretations sometimes are developed to meet local needs. Data were assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management were assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can state with a fairly high degree of probability that a given soil will have a high water table within certain depths in most years, but they cannot assure that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Map Unit Composition

A map unit delineation on a soil map represents an area dominated by one major kind of soil or an area dominated by several kinds of soil. A map unit is identified and named according to the taxonomic classification of the dominant soil or soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural objects. In common with other natural objects, they have a characteristic variability in their properties. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of soils of other taxonomic classes. Consequently, every map unit is made up of the soil or soils for which it is named and some soils that belong to other taxonomic classes. In the detailed soil map units, these latter soils are called inclusions or included soils. In the general soil map units, they are called soils of minor extent.

Most inclusions have properties and behavioral patterns similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting (similar) inclusions. They may or may not be mentioned in the map unit descriptions. Other inclusions, however, have properties and behavior divergent enough to affect use or require different management. These are contrasting (dissimilar) inclusions. They generally occupy small areas and cannot be shown separately on the soil maps because of the scale used in mapping. The inclusions of contrasting soils are mentioned in the map unit descriptions. A few inclusions may not have been observed, and consequently are not mentioned in the descriptions, especially where the soil pattern was so complex that it was impractical to make enough observations to identify all of the kinds of soils on the landscape.

The presence of inclusions in a map unit in no way diminishes the usefulness or accuracy of the soil data. The objective of soil mapping is not to delineate pure taxonomic classes of soils but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but onsite investigation is needed to plan for intensive uses in small areas.

Use of the Ground-Penetrating Radar

In Seminole County, a ground-penetrating radar (GPR) system was used to document the type and variability of soils that occur in the detailed map units *(4, 5, 8, and 10)*. The GPR system was successfully used on most soils to detect the presence, determine the variability, and measure depth to major soil horizons or other soil features. In Seminole County 401 random transects were made with the GPR. Information from notes and ground-truth observations made in the field was used along with radar data from this study to classify the soils and to determine the composition of map units. The map units, as described in the section entitled "Detailed Soil Map Units," are based on this data and on data in the previous survey.

Confidence Limits of Soil Survey Information

The statements about soil behavior in this survey can be thought of in terms of probability: they are predictions of soil behavior. The behavior of a soil depends not only on its own properties but on responses to such variables as climate and biological activity. Soil conditions are predictable for the long term, but predictable reliability is less for any given year. For example, while a soil scientist can state that a given soil has a high water table in most years, he can not say with certainty that the water table will be present next year.

Confidence limits are statistical expressions of the probability that the composition of a map unit or a property of the soil will vary within prescribed limits. Confidence limits can be assigned numerical values based on a random sample. In the absence of specific data to determine confidence limits, the natural variability of soils and the way soil surveys are made must be considered. The composition of map units and other information are derived largely from extrapolations made from a small sample. Also, information about the soils does not extend below a depth of about 6 feet. The information presented in the soil survey is not meant to be used as a substitute for on-site investigations. Soil survey information can be used to select from alternative practices or general designs that may be needed to minimize the possibility of soil-related failures. It cannot be used to interpret specific points on the landscape.

Specific confidence limits for the composition of most map units in Seminole County were determined by random transects made with the GPR across mapped areas. When no dissimilar soils were encountered, only the statistical expressions of mean is used in the map unit description. This condition occurs in map units 5, 12, 14, 22, and 33. The data are presented in the description of each soil under 'Detailed Soil Map Units' and summarized in table 2. Soil scientists made enough transects and took enough samples to characterize each map unit on table 2 at a specific confidence level. For example, map unit 28 was characterized at a 90 percent confidence level based on the transect data. The resulting composition would read: in 90 percent of the areas mapped as Pompano fine sand, occasionally flooded, Pompano soil and similar soils will comprise 82 to 99 percent of the delineation. In the other 10 percent of the areas of this map unit, the percentage of Pompano soil and similar soils may be higher than 99 percent or lower than 82 percent.

The composition of miscellaneous areas, urban map units, and a few other map units were based on the judgment of the soil scientist and was not determined by a statistical procedure.

Table 2 presents the average composition of the map units and expresses the probability that the average composition will fall within the given range. The map unit is named for the taxon of the dominant soil or soils. The proportion of similar and dissimilar soils are also given. Each soil listed by name in the table is described in the section "Soil Series and Their Morphology."

General Soil Map Units

The general soil map at the back of this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, a map unit consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in other units but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or a building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

Mineral Soils on the Uplands

The three general soil map units in this group are in the western part of Seminole County and around the Geneva and Chuluota areas.

1. Urban Land-Pomello-Paola

Nearly level to sloping areas of Urban land and moderately well drained and excessively drained soils that are sandy throughout; on the uplands

The soils in this map unit are in the vicinity of Geneva. The landscape consists of broad, rolling ridges. The ridges are in a north-south orientation. The slopes are smooth and are dissected by a few drainageways, and they range from 0 to 8 percent.

This map unit makes up about 4 percent of Seminole County. It is about 35 percent Urban land, 26 percent Pomello soils and similar soils, 23 percent Paola soils and similar soils, and 16 percent soils of minor extent.

The Urban land part of this map unit is covered by concrete, asphalt, buildings, or other impervious surfaces that obscure or alter the soils so that their identification is not feasible.

Pomello soils are moderately well drained. They are on low ridges bordering the plains. Typically, Pomello soils have a surface layer of light gray fine sand. The subsurface layer is white fine sand. The upper part of the subsoil is black fine sand, the middle part is dark brown fine sand, and the lower part is brown fine sand. The substratum is very pale brown fine sand.

Paola soils are excessively drained. They are on ridges on the uplands. Typically, Paola soils have a surface layer of dark gray sand. The subsurface layer is light gray sand. The upper part of the subsoil is yellowish brown sand and has few tongues filled with material from the overlying layer and few to common weakly cemented very dark gray concretions. The substratum is light yellowish brown sand.

The soils of minor extent are Apopka, Astatula, Tavares, Millhopper, and EauGallie soils. Apopka and Astatula soils are on ridges and hillsides. Apopka soils are well drained, and Astatula soils are excessively drained. Tavares and Millhopper soils are on hillsides and low ridges and knolls on the uplands. EauGallie soils are on the plains. These soils are poorly drained.

Most areas of the soils in this map unit have been developed for urban use or have been left in native vegetation. The native vegetation consists of turkey oak and bluejack oak and scattered longleaf pine, slash pine, and sand pine. The understory includes saw palmetto, creeping bluestem, pineland threeawn, panicum, indiangrass, and chalky bluestem. A few areas are used for citrus crops or as improved pasture.

The soils in this map unit are moderately well suited to urban and recreational uses. These soils are moderately well suited to poorly suited to use as improved pasture. They are poorly suited to use as commercial woodland. Droughtiness is the main limitation.

2. Urban Land-Astatula-Apopka

Nearly level to strongly sloping areas of Urban land, excessively drained soils that are sandy throughout, and well drained sandy soils that have a loamy subsoil at a depth of about 40 inches or more; on the uplands

The soils in this map unit are in the vicinity of Geneva and Chuluota and in the western part of the county. The landscape consists of rolling hillsides and ridges. Sinkholes are common and provide most drainage outlets for the soils in this map unit. The slopes range from 0 to 12 percent.

This map unit makes up about 22 percent of Seminole County. It is about 55 percent Urban land, 25 percent Astatula soils and similar soils, 8 percent Apopka soils and similar soils, and 12 percent soils of minor extent.

The Urban land part of this map unit is covered by concrete, asphalt, buildings or other impervious surfaces that obscure or alter the soils so that their identification is not feasible.

Typically, Astatula soils have a surface layer of light gray fine sand 3 inches thick. The underlying material is very pale brown fine sand.

Typically, Apopka soils have a surface layer of gray fine sand about 6 inches thick. The upper part of the subsurface layer is yellow fine sand, and the lower part is very pale brown fine sand that has a few fine sand lamellae. The subsoil is reddish yellow sandy clay loam.

The soils of minor extent are Tavares, Pomello, Millhopper, Basinger, and Smyrna soils. Tavares, Pomello, and Millhopper soils are on low ridges bordering the plains. These soils are moderately well drained. Basinger and Smyrna soils are in flat areas, depressions, and sloughs. These soils are poorly drained and very poorly drained.

Most of the acreage in this map unit is used for houses, large buildings, shopping centers, golf courses, and related urban uses. Only a few areas have been left in native vegetation. The native vegetation consists of bluejack oak, live oak, and turkey oak. The understory includes chalky bluestem, indiangrass, panicum, pineland threeawn, and annual forbs. Farming is of little importance because of the extensive urban development, but numerous nurseries produce plants for landscaping.

The soils in this map unit are well suited to urban use (fig. 5) and moderately well suited to recreational use. These soils are moderately well suited to use as improved pasture. They are poorly suited to use as commercial woodland. Droughtiness is the main limitation.

3. Urban Land-Tavares-Millhopper

Nearly level to sloping areas of Urban land and moderately well drained soils that are sandy throughout or have a loamy subsoil at a depth of about 40 inches or more; on the uplands

The soils in this map unit are on low ridges adjacent to the flatwoods in the western and southern parts of the county and near Chuluota in the eastern part. The slopes range from 0 to 8 percent.

Figure 5.—The soils in this undeveloped area of the Urban land-Astatula-Apopka general soil map unit are well suited to urban use.

This map unit makes up about 23 percent of Seminole County. It is about 57 percent Urban land, 16 percent Pomello soils and similar soils, 13 percent Millhopper soils and similar soils, and 14 percent soils of minor extent.

The Urban land part of this map unit is covered by concrete, asphalt, buildings, or other impervious surfaces that obscure or alter the soils so that their identification is not feasible.

Typically, Tavares soils have a surface layer of very dark grayish brown fine sand. The upper part of the substratum is yellowish brown fine sand, the middle part is light yellowish brown and very pale brown fine sand, and the lower part is white fine sand. The middle part and lower part of the subtratum have mottles.

Typically, Millhopper soils have a surface layer of gray fine sand. The upper part of the subsurface layer is very pale brown fine sand, the middle part is pale brown fine sand, and the lower part is very pale brown fine sand and has mottles. The upper part of the subsoil is very pale brown sandy loam, and the lower part is light gray sandy clay loam and has common mottles.

The soils of minor extent are Basinger, Samsula, Immokalee, Hontoon, and Pomello soils. Basinger and Immokalee soils are in flat areas and in sloughs. These soils are poorly drained. Samsula and Holopaw soils are in depressions. These soils are very poorly drained. Pomello soils are moderately well drained, and they are in similar positions on the landscape as Tavares and Millhopper soils.

Most of the acreage in this map unit is used for houses, large buildings, shopping centers, golf courses, and related urban uses. Only a few areas have been left in natural vegetation. The natural vegetation consists of bluejack oak, turkey oak, live oak, and longleaf pine. The understory includes creeping bluestem, indiangrass, grassleaf goldaster, and pineland threeawn. Farming is of little importance because of the extensive urban development, but numerous nurseries produce plants for landscaping.

The soils in this map unit are well suited to urban and recreational uses and commercial woodland. These soils are poorly suited to use as improved pasture. Low natural fertility and droughtiness are the main limitations.

Mineral Soils on the Flatwoods and in Sloughs and Depressions

The three general soil map units in this group are between the upland ridges and the flood plains, depressions, and swamps throughout Seminole County.

4. Myakka-EauGallie-Urban Land

Nearly level, poorly drained soils that are sandy throughout or have a loamy subsoil at a depth of about 40 inches or more and areas of Urban land; on the flatwoods

The soils in this map unit are throughout Seminole County. The landscape consists of broad plains that have depressions and sloughs. During wet periods, the depressions are ponded and the sloughs are covered with shallow, slow flowing water. The slopes range from 0 to 2 percent.

This map unit makes up about 24 percent of Seminole County. It is about 37 percent Myakka soils, 20 percent EauGallie soils, 18 percent Urban land, and 25 percent soils of minor extent.

Typically, Myakka soils have a surface layer of black fine sand. The subsurface layer is light gray fine sand. The upper part of the subsoil is black fine sand, and the lower part is dark brown fine sand. The substratum is brown fine sand.

Typically, EauGallie soils have a surface layer of dark gray fine sand. The subsurface layer is light gray fine sand. The upper part of the subsoil is black and dark brown fine sand. The next layer is light brownish gray fine sand. The lower part is very pale brown sandy clay loam. The substratum is light brownish gray loamy sand.

The Urban land part of this map unit is covered by concrete, asphalt, buildings, or other impervious surfaces that obscure or alter the soils so that their identification is not feasible.

The soils of minor extent in this map unit are Basinger, Immokalee, Samsula, Hontoon, Pompano, St. Johns, and Adamsville soils. Basinger soils are in sloughs. These soils are poorly drained. Immokalee and St. Johns soils are in the same position on the landscape as the soils in this map unit. Pompano soils are on the flood plains. Samsula soils are in swamps and depressions. Hontoon soils are in swamps and marshes. These soils are very poorly drained. Adamsville soils are on low knolls on the flatwoods. They are somewhat poorly drained.

About 40 percent of the soils on the flatwoods in this map unit is in native vegetation of slash pine. The understory includes saw palmetto, grasses, and forbs. Cypress and hardwoods are in the depressions and sloughs. The remaining acreage is used for residential development or as improved pasture.

The soils in this map unit are poorly suited to urban and recreational uses. They are well suited to use as improved pasture and commercial woodland. Wetness is the main limitation.

5. St. Johns-Malabar-Wabasso

Nearly level, poorly drained soils that are sandy throughout or have a loamy subsoil at a depth of about 30 inches or more; on the flatwoods and in sloughs

The soils in this map unit are in the central part of Seminole County. The landscape consists of broad plains that have depressions and sloughs. During wet periods, the depressions are ponded and the sloughs are covered with shallow, slow flowing water. The slopes range from 0 to 2 percent.

This map unit makes up about 8 percent of Seminole County. It is about 28 percent St. Johns soils, 28 percent Malabar soils, 23 percent Wabasso soils, and 21 percent soils of minor extent.

St. Johns soils are on the broad plains on the flatwoods. These soils have a surface layer of black fine sand. The subsurface layer is gray fine sand. The subsoil is black and very dark gray fine sand. The substratum is grayish brown fine sand.

Malabar soils are in sloughs. These soils have a surface layer of dark gray fine sand. The subsurface layer is yellowish brown fine sand. The upper part of the subsoil is very pale brown and yellow fine sand. The next layer is light gray fine sand. The lower part of the subsoil is gray fine sandy loam. The substratum is greenish gray loamy sand.

Wabasso soils are on the flatwoods. These soils have a surface layer of very dark gray fine sand. The subsurface layer is grayish brown fine sand. The upper part of the subsoil is dark reddish brown fine sand. The next layer is light brownish gray fine sand. The lower part of the subsoil is gray sandy clay loam. The substratum is light gray loamy sand.

The soils of minor extent in this map unit are Basinger, Samsula, and Hontoon soils. Basinger soils are in similar positions on the landscape as Malabar soils. These soils are poorly drained and very poorly drained. Samsula and Hontoon soils are in swamps. These soils are very poorly drained.

About 50 percent of the soils on the flatwoods in this map unit is in native vegetation of slash pine. The understory includes saw palmetto, grasses, and forbs. Cypress and hardwoods are in the depressions and sloughs. The remaining acreage is used for residential development or improved pasture.

The soils in this map unit are poorly suited to urban and recreational uses. They are moderately well suited to use as improved pasture and commercial woodland. Wetness is the main limitation.

6. Basinger-Smyrna-Delray

Nearly level, poorly drained and very poorly drained soils that are sandy throughout or have a loamy subsoil at a depth of about 50 inches; in sloughs and depressions on the flatwoods

The soils in this map unit are in the eastern and northern parts of Seminole County. The landscape consists of broad plains that have depressions and sloughs. During wet periods, the depressions are ponded and the sloughs are covered with shallow, slow flowing water. The slopes range from 0 to 2 percent.

This map unit makes up about 7 percent of Seminole County. It is about 55 percent Basinger soils, 16 percent Smyrna soils, 9 percent Delray soils, and 20 percent soils of minor extent.

Basinger soils are in the sloughs and depressions. These soils have a surface layer of very dark gray fine sand. The subsurface layer is light gray fine sand. The subsoil is a mixture of light gray fine sand from the subsurface layer and dark grayish brown fine sand. The substratum is gray fine sand.

Smyrna soils are in the depressions. These soils are very poorly drained. They have a surface layer of black fine sand. The subsurface layer is light gray fine sand. The subsoil is very dark grayish brown and dark brown fine sand. The substratum is light yellowish brown and light gray fine sand.

Delray soils are in similar positions on the landscape as Basinger soils. These soils are very poorly drained. They have a surface layer of black fine sand. The subsurface layer is light gray fine sand. The subsoil is gray sandy loam.

The soils of minor extent in this map unit are Immokalee, Myakka, St. Johns, Pompano, Nittaw, and Floridana soils. Immokalee, Myakka, and St. Johns soils are on higher plains on the flatwoods than the soils in the map unit. Pompano, Nittaw, and Floridana soils are on the flood plains. The soils of minor extent are poorly drained except Nittaw and Floridana soils, which are very poorly drained.

About 80 percent of the soils in this map unit is in native vegetation of slash pine, cabbage palm, oak, cypress, elm, ash, hickory, red maple, and sweetgum and have an understory of water-tolerant plants. The remaining acreage is used as improved pasture.

The soils in this map unit are poorly suited to urban and recreational uses. They are moderately well suited to use as improved pasture and commercial woodland. Wetness is the main limitation.

Mineral and Organic Soils on the Flood Plains and in Depressions and Swamps

The four general soil map units in this group are adjacent to rivers and lakes throughout Seminole County.

7. Nittaw-Felda-Floridana

Nearly level, very poorly drained and poorly drained mineral soils; some are mucky and have a clayey subsoil at a depth of about 10 inches or more, and some are sandy to a depth of 20 to 40 inches and have a loamy subsoil; on the flood plains and in depressions

The soils in this map unit are adjacent to Lake Jessup and St. Johns River. The landscape consists of broad plains and depressions. The slopes range from 0 to 2 percent.

This map unit makes up about 4 percent of Seminole County. It is about 52 percent Nittaw soils, 20 percent Felda soils, 10 percent Floridana soils, and 18 percent soils of minor extent.

Nittaw soils are very poorly drained. These soils have a surface layer of black muck and black mucky fine sand. The subsoil is very dark brown and dark gray sandy clay. The substratum is gray sandy loam.

Felda soils are poorly drained. These soils have a surface layer of black mucky fine sand. The subsurface layer is fine sand in shades of gray. The subsoil is gray sandy clay loam and sandy loam. The substratum is gray loamy sand.

Floridana soils are very poorly drained. These soils have a surface layer of black mucky fine sand and black fine sand. The subsurface layer is gray fine sand. The subsoil is gray fine sandy loam and sandy loam.

The soils of minor extent in this map unit are Manatee, Holopaw, Okeelanta, Basinger, Delray, and Wabasso soils. Manatee soils are in similar positions on the landscape as the soils in this map unit. These soils are very poorly drained. Holopaw and Okeelanta soils are on the flood plains. Holopaw soils are poorly drained, and Okeelanta soils are very poorly drained. Basinger and Delray soils are in sloughs. Delray soils are very poorly drained. Wabasso soils are on the plains and are poorly drained.

Most areas of the soils in this map unit have been cleared and are used for livestock production. Other areas are in native vegetation of water oak, cypress, elm, ash, hickory, red maple, and sweetgum and have an understory of water-tolerant plants.

The soils in this map unit are poorly suited to urban and recreational uses. They are fairly well suited to use as commercial woodland and are moderately well suited to use as improved pasture and rangeland (fig. 6).

Figure 6.—The soils in this Nittaw-Felda-Floridana general soil map unit have been utilized for livestock production. These soils are moderately well suited to use as improved pasture and rangeland.

8. Nittaw-Okeelanta-Terra Ceia

Nearly level, very poorly drained mineral and organic soils; some are mucky and have a clayey subsoil at a depth of about 10 inches or more, some are mucky and have a sandy layer at a depth of about 40 inches or more, and some are mucky throughout; on the flood plains and in depressions

The soils in this map unit are on the flood plains adjacent to Lake Monroe and Lake Jessup. The landscape consists of flats that have many small drainageways. Most areas of these soils are subject to frequent flooding. The slopes range from 0 to 2 percent.

This map unit makes up 4 percent of Seminole County. It is about 44 percent Nittaw soils, 21 percent Okeelanta soils, 13 percent Terra Ceia soils, and 22 percent soils of minor extent.

Nittaw soils are on the flood plains and in depressions. These soils have a surface layer of black muck and black mucky fine sand. The subsoil is very brown and dark gray sandy clay. The substratum is light gray fine sand.

Okeelanta soils are on the flood plains. These soils have a surface layer of black muck. The underlying material is black and light gray fine sand.

Terra Ceia soils are on the flood plains and in depressions. These soils have a surface layer of black and very dark brown muck that extends to a depth of 80 inches or more.

The soils of minor extent in this map unit are Basinger, Felda, Manatee, and Hontoon soils. Basinger soils are in sloughs adjacent to the uplands. These soils are poorly drained. Felda and Manatee soils are in similar positions on the landscape as Nittaw soils, but Felda soils are poorly drained. Hontoon soils are in swamps.

Most areas of the soils in this map unit have been left in native vegetation of hardwoods and cypress and have an understory of water-tolerant plants. An area southeast of Lake Jessup has been cleared and is used to grow truck crops.

The soils in this map unit are poorly suited to urban and recreational uses and to use as improved pasture and commercial woodland. Wetness is the main limitation. Flooding is a hazard.

9. Brighton-Samsula-Sanibel

Nearly level, very poorly drained organic and mineral soils; some are mucky throughout, some are mucky and have a sandy layer at a depth of about 30 inches or more, and some are sandy throughout; in depressions and swamps

The soils in this map unit are south of Lake Jessup. These soils are ponded. The slopes are mostly less than 1 percent.

This map unit makes up about 1 percent of Seminole County. It is about 47 percent Brighton soils, 35 percent Samsula soils, 11 percent Sanibel soils, and 7 percent soils of minor extent.

Brighton soils are in the center of the depressions and swamps. These soils have a layer of black muck and very dark gray and dark reddish brown mucky peat more than 80 inches thick.

Samsula soils are between Brighton and Sanibel soils in the depressions and swamps. Samsula soils have a surface layer of dark reddish brown and black muck and very dark gray mucky fine sand. The underlying material is grayish brown fine sand.

Sanibel soils are in depressions adjacent to upland water. These soils have a surface layer of black muck and black mucky fine sand. The underlying material is dark grayish brown and light gray fine sand.

The soils of minor extent in this map unit are Basinger and Delray soils. These soils are in depressions and swamps in similar positions on the landscape as Sanibel soils, but Basinger soils are poorly drained.

Most areas of the soils in this map unit have been cleared and drained and are used to grow truck crops and sod. A few areas of these soils are in native vegetation of hardwoods and cypress and have an understory of water-tolerant plants.

The soils in this map unit are not suited to urban use or to use as commercial woodland. They are poorly suited to improved pasture and recreational use. Wetness is the major limitation. Ponding is a hazard.

10. Pompano-Nittaw-Basinger

Nearly level, poorly drained and very poorly drained mineral soils; some are sandy throughout, and some are mucky and have a clayey subsoil at a depth of about 10 inches or more; on the flood plains

The soils in this map unit are in areas adjacent to the Wekiva, St. Johns, and Econlockhatchee Rivers and Lake Jessup. The landscape consists of broad, freshwater plains, hardwood and cypress swamps, and depressions. These soils are ponded or flooded for most of the year. The slopes are less than 1 percent.

This map unit makes up about 3 percent of Seminole County. It is about 42 percent Pompano soils, 22 percent Nittaw soils, 12 percent Basinger soils, and 24 percent soils of minor extent.

Pompano soils are poorly drained. These soils have a surface layer of gray fine sand. The upper part of the underlying material is pale brown fine sand, and the lower part is light gray fine sand.

Nittaw soils are very poorly drained. These soil have a surface layer of black muck and black mucky fine sand. The subsoil is very dark brown and dark gray sandy clay. The substratum is gray sandy loam.

Basinger soils are mainly adjacent to the uplands and are poorly drained and very poorly drained. These soils have a surface layer of very dark gray fine sand. The subsurface layer is light gray fine sand. The subsoil is a mixture of light gray fine sand from the subsurface layer and dark grayish brown fine sand. The substratum is gray fine sand.

The soils of minor extent in this map unit are Samsula, Hontoon, Smyrna, and Okeelanta soils. These soils are in slightly lower positions on the landscape than the soils in this map unit. They are very poorly drained.

Most areas of the soils in this map unit have been left in native vegetation of magnolia, sweetgum, cypress, sweetbay, hickory, water oak, willow oak, and laurel oak. A few areas are used as improved pasture.

The soils in this map unit are poorly suited to urban and recreational uses and to use as commercial woodland. They are moderately well suited to use as improved pasture. Wetness is the main limitation. Flooding and ponding are hazards.

Detailed Soil Map Units

The map units on the detailed soil maps at the back of this survey represent the soils in the survey area. Table 2 gives the average composition of selected map units as determined by the ground-penetrating radar (GPR) and other transect methods. The map units in this section are based on this data and on data in the previous survey. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit, or soil, is given under "Use and Management of the Soils."

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

A symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying material, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Astatula fine sand, 0 to 5 percent slopes, is one of several phases in the Astatula series.

Some map units are made up of two or more major soils. These map units are called soil complexes, soil associations, or undifferentiated groups.

A *soil complex* consists of two or more soils in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Adamsville-Sparr fine sands is an example.

An *undifferentiated group* is made up of two or more soils that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils in a mapped area are not uniform. An area can be made up of only one of the major soils, or it can be made up of all of them. Basinger, Samsula, and Hontoon soils, depressional, is an undifferentiated group in this survey area.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Urban land is an example. Miscellaneous areas are shown on the soil maps. Some that are too small to be shown are identified by a special symbol on the soil maps.

Table 3 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils.

A few of the boundaries on the soil maps of Seminole County do not match those on the soil maps of adjacent counties, and some of the soil names and descriptions do not fully agree. The differences are the result of improvements in the classification of soils, particularly modification or refinements in soil series concepts. Also, there may be differences in the intensity of mapping or in the extent of the soils within the survey area.

2—Adamsville-Sparr fine sands. The soils in this map unit are level to nearly level and somewhat poorly drained. They are on the low ridges on the uplands and on low knolls on the flatwoods. The slopes are dominantly less than 2 percent.

In 90 percent of the areas of this map unit, Adamsville-Sparr fine sands and soils that are similar make up 80 to 99 percent of the mapped areas. Dissimilar soils make up 1 to 20 percent of the mapped areas. Generally, the mapped areas consist of about 54 percent Adamsville soil and similar soils and 36 percent

Sparr soil. The individual areas of the soils in this map unit are so intricately mixed that mapping them separately at the selected scale is not practical. However, proportions and soil patterns are relatively consistent in most delineations of the map unit.

Typically, Adamsville soil has a surface layer of grayish brown fine sand about 4 inches thick. The upper part of the underlying material, to a depth of about 45 inches, is light grayish brown and very pale brown fine sand and has brownish yellow mottles. The lower part to a depth of about 80 inches is light gray fine sand.

Typically, Sparr soil has a surface layer of very dark grayish brown fine sand about 4 inches thick. The upper part of the subsurface layer, to a depth of about 15 inches, is grayish brown fine sand. The lower part, to a depth of about 41 inches, is pale brown and light yellowish brown fine sand. The upper part of the subsoil, to a depth of about 43 inches, is very pale brown sandy loam. The middle part, to a depth of about 72 inches, is light gray fine sandy loam. The lower part to a depth of about 80 inches is gray sandy loam.

A seasonal high water table is within 12 to 36 inches of the surface of Adamsville and Sparr soils for up to 6 months. The permeability of Adamsville soil is rapid. The permeability of Sparr soil is rapid in the surface and subsurface layers and is slow or moderately slow in the subsoil. The available water capacity is low to very low in Adamsville soil, and it is low in the surface and subsurface layers and moderate in the subsoil of Sparr soil. Natural fertility is low in Adamsville and Sparr soils.

Dissimilar soils included in mapping are Immokalee soils in small areas. These soils are poorly drained. Also included are some dissimilar soils that are poorly drained and have a dark color subsoil within 20 inches of the surface.

The soils in this map unit are used mainly as rangeland and pasture. These soils are also used for urban development or have been left in natural vegetation. The natural vegetation consists mostly of longleaf pine and slash pine and of laurel, live, water, blackjack, and turkey oaks. The understory includes scattered saw palmetto, pineland threeawn, gallberry, and waxmyrtle.

The soils in this map unit are generally not suited to most cultivated crops and citrus crops because of periodic wetness, which restricts the root zone. The number of crops that can be grown on these soils is very limited unless intensive measures are used to control excess surface and internal water. A drainage system is needed for most cultivated crops. If suitable outlets are available, lateral ditches and tile drains can be used to lower the high water table. If citrus crops are grown, proper arrangement and bedding of tree rows, lateral ditches or tiles, and well constructed outlets help to remove excess surface water and to lower the high water table. Maintaining crop residue on or near the surface reduces runoff and helps to maintain soil tilth and the content of organic matter.

If a water control system is established and maintained, the soils in this map unit are moderately suited to use as pasture. Bahiagrass, pangolagrass, and bermudagrass grow well on this soil. Proper stocking, pasture rotation, and restricted grazing during wet periods help keep the pasture and the soil in good condition. Fertilizer and lime are needed for optimum growth of grasses and legumes.

The soils in this map unit are moderately well suited to use for homesites or for other urban or recreational development. The main limitations are wetness, instability of cutbanks, and contamination of ground water. Population growth has resulted in increased construction of houses. These soils are poorly suited to use as septic tank absorption fields. Septic tank absorption fields do not function properly during rainy periods because of wetness. If the density of housing is moderate or high, a community sewage system is needed to prevent contamination of water supplies by seepage. When installing a septic tank absorption field on this soil, the proximity to a stream, lake, or canal should be considered to prevent lateral seepage and ground water pollution.

The soils in this map unit are moderately suited to use as habitat for openland and woodland wildlife. They are poorly suited to habitat for wetland wildlife.

Common wildlife in the county includes the fox squirrel, deer, quail, ground dove, towhee, gopher tortoise, pocket gopher, and fence lizard. So much of this community has been converted to citrus groves or for urban development that this habitat for wildlife and several species that are dependent upon it are considered endangered.

The soils in this map unit are in capability subclass IIIw and in the South Florida Flatwoods range site. The woodland ordination symbol for these soils is 10W.

3—Arents, 0 to 5 percent slopes. This soil consists of material dug from several areas that have different kinds of soil. This fill material is the result of earthmoving operations. This material is used to fill such areas as sloughs, marshes, shallow depressions, swamps, and other low-lying areas above their natural ground levels, for use in land leveling operations, or as a final cover for sanitary landfills.

In many areas, Arents soil has a surface layer about 30 to 50 inches thick. It is very dark gray, dark gray, dark grayish brown, and yellowish brown fine sand or sand mixed with discontinuous strata of grayish brown and light brownish gray loamy material. Thin discontinuous areas of a dark color sandy subsoil are also scattered through the soil. Below these areas, to a depth of about 52 inches, is undisturbed soil that is commonly black fine sand. The next layer, to a depth of about 72 inches, is light gray or gray fine sand. The lower part to a depth of about 80 inches is black or very dark brown sandy clay loam.

Included in mapping are small areas of soils that are similar to Arents soil but have slopes of more than 5 percent, which is the result of stockpiling. Also included are areas that are used as sanitary landfills and contain up to 50 percent of solid waste material stratified with layers of soil material. These areas are named "Sanitary landfill" on the soil maps. Fill material used in some areas contain fragments of shells, whole shells, and a few rock fragments. The included soils make up less than 10 percent of the map unit.

Most soil properties are variable. However, the permeability of the soil in this map unit is moderately rapid or rapid. The high water table varies with the amount of fill material and artificial drainage within any mapped area. In most years, the high water table is at a depth of 24 to 36 inches for 2 to 4 months. During extended dry periods, a high water table is not within 5 feet of the surface. The reaction ranges from slightly acid to mildly alkaline.

This Arents soil is mainly used for urban development. The existing vegetation consists of slash pine and various scattered weeds. Scattered throughout the map unit are some small areas that have been left in natural vegetation. The natural vegetation includes cabbage palm, saw palmetto, waxmyrtle, Brazilian pepper, greenbrier, and various weeds and grasses. The suitability of this map unit varies according to the individual site.

Arents has not been assigned to a capability subclass, woodland group, or range site.

4—Astatula fine sand, 0 to 5 percent slopes. This soil is level to gently sloping and excessively drained. It is on hillsides and ridges on the uplands. The slopes are smooth to convex.

In 90 percent of the areas of this map unit, Astatula fine sand, 0 to 5 percent slopes, and soils that are similar make up 76 to 98 percent of the mapped areas. Dissimilar soils make up 2 to 24 percent of the mapped areas.

Typically, this soil has a surface layer of very dark gray fine sand about 4 inches thick. The underlying material extends to a depth of about 80 inches. The upper part is very pale brown fine sand, and the lower part is yellow fine sand. In the mapped areas are soils that are similar to Astatula fine sand but they have lamellae or spodic bodies in the lower part of the underlying material.

This soil has a seasonal high water table at a depth of more than 80 inches. The permeability is very rapid. The available water capacity is very low. Natural fertility is very low.

Dissimilar soils included in mapping are Apopka and Pomello soils in small areas. Apopka soils have a loamy subsoil. Pomello soils are moderately well drained. Also included are some dissimilar soils that are in lower positions on the landscape than Astatula soil and are moderately well drained.

In most areas, this soil is used for homesites and other urban development. In a few areas, it is used for citrus crops or is left in natural vegetation. The natural vegetation consists mostly of sand pine, sand hickory and scrub hickory, and scattered turkey oak and bluejack oak. The understory includes yucca, pricklypear, indiangrass, panicum, and pineland threeawn.

This Astatula soil is suited to citrus crops in areas that are relatively free of freezing temperatures. If this Astatula soil is used for cultivated crops, the main limitations are droughtiness and the rapid leaching of plant nutrients. Droughtiness, as a result of the very low available water capacity, is a concern in management particularly during extended dry periods. Irrigation is generally feasible if water is readily available. Soil blowing is a hazard in cultivated areas. A ground cover of close-growing plants can control soil blowing. Crop residue left on or in the soil and a cropping system that includes grasses, legumes, or a grass-legume mixture help to conserve moisture, to maintain fertility, and to control erosion.

This soil is moderately well suited to pasture. The very low available water capacity limits the production of plants during extended dry periods. Deep-rooted plants, such as Coastal bermudagrass and bahiagrass, are more drought tolerant if properly fertilized and limed. Proper stocking, pasture rotation, and timely deferment of grazing help keep the pasture in good condition.

This soil is well suited to use for homesites and other urban development. It has few limitations. Population growth has resulted in increased construction of houses. If the density of housing is moderate or high, a community sewage system may prevent contamination of water supplies by seepage. The proximity to a stream or canal should be considered in the placement of a septic tank absorption field to prevent lateral seepage and ground water pollution.

This soil is poorly suited to sewage lagoons, sanitary landfills, and shallow excavations. The main limitations are cutbanks caving, seepage, and sandy texture. Sidewalls of shallow excavations should be shored. Sealing or lining of lagoons or landfills with impervious material reduces excess seepage.

If this soil is used for recreational development, the main limitation is droughtiness. During dry periods, irrigation is needed to maintain lawns and landscaping. The sandy surface layer should be stabilized and an adequate plant cover should be maintained.

This soil is poorly suited to use as habitat for openland and woodland wildlife. It is not suited to use as habitat for wetland wildlife.

Common wildlife in the county includes the fox squirrel, deer, quail, ground dove, towhee, gopher tortoise, pocket gopher, and fence lizard. So much of this community has been converted to citrus groves or urban development that this habitat for wildlife and several species dependent upon it are considered endangered.

This Astatula soil is in capability subclass VIs. The woodland ordination symbol for this soil is 3S. This soil is in the Longleaf Pine-Turkey Oak Hills range site.

5—Astatula fine sand, 5 to 8 percent slopes. This soil is sloping and excessively drained. It is on hillsides on the uplands. The slopes are smooth to convex.

This map unit consists of about 97 percent Astatula fine sand, 5 to 8 percent slopes, and about 3 percent of soils that are similar to Astatula soil.

Typically, this soil has a surface layer of light gray fine sand about 3 inches thick. The underlying material extends to a depth of about 80 inches. It is very pale brown fine sand in the upper part and is yellow fine sand in the lower part. In the mapped areas are soils that are similar to Astatula soil, but they have lamellae at a depth of more than 60 inches.

This soil has a seasonal high water table at a depth of more than 80 inches. The permeability is very rapid. The available water capacity is very low. Natural fertility is very low.

In most areas, this soil is used for homesites and other urban development. In a few areas, it is used for citrus crops or has been left in natural vegetation. The natural vegetation consists mostly of sand pine, sand hickory, scrub hickory, and scattered turkey oak and bluejack oak. The understory includes yucca, pricklypear, indiangrass, panicum, and pineland threeawn.

This Astatula soil is suited to citrus crops in areas that are relatively free of freezing temperatures. If this soil is used for cultivated crops, the main limitations are droughtiness and the rapid leaching of plant nutrients. Droughtiness, as a result of the very low available water capacity, is a concern in management particularly during extended dry periods. It is generally feasible to irrigate crops if water is readily available. Soil blowing is a hazard in cultivated areas. A ground cover of close-growing plants can control soil blowing. Crop residue left on or in the soil and a cropping system that includes grasses, legumes, or a grass-legume mixture help to conserve moisture, to maintain fertility, and to control erosion.

This soil is moderately well suited to use as pasture. The very low available water capacity limits the production of plants during extended dry periods. Deep-rooted plants, such as Coastal bermudagrass and bahiagrass, are more drought tolerant if properly fertilized and limed. Proper stocking, pasture rotation, and timely deferment of grazing help keep the pasture in good condition.

This soil is well suited to use as homesites and other urban development. It has few limitations. Population growth has resulted in increased construction of houses. If the density of housing is moderate or high, a community sewage system may help to prevent contamination of water supplies by seepage. The proximity to a stream or canal should be considered in placement of septic tank absorption fields to prevent lateral seepage and ground water pollution.

This soil is poorly suited to sewage lagoons, sanitary landfills, and shallow excavations. The main limitations are seepage, cutbanks caving, and sandy textures. Sidewalls of shallow excavations should be shored. Sealing or lining of lagoons or landfills with impervious material reduces excess seepage.

If this soil is used for recreational development, the main limitation is droughtiness. During dry periods, irrigation is needed to maintain lawns and landscaping. The sandy surface layer should be stabilized, and an adequate plant cover should be maintained.

This soil is poorly suited to use as habitat for openland and woodland wildlife. It is not suited to habitat for wetland wildlife.

Common wildlife in this county includes the fox squirrel, deer, quail, ground dove, towhee, gopher tortoise, pocket gopher, and fence lizard. So much of this community has been converted to citrus groves or urban development that this wildlife habitat and several species dependent upon it are considered endangered.

This Astatula soil is in capability subclass VIs. The woodland ordination symbol for this soil is 3S. This soil is in the Longleaf Pine-Turkey Oak Hills range site.

6—Astatula-Apopka fine sands, 0 to 5 percent slopes. The soils in this map unit are nearly level to gently sloping and excessively drained and well drained. These soils are on hillsides and ridges on the uplands. Astatula soil is excessively drained, and Apopka soil is well drained. The slopes are smooth to convex.

In 95 percent of the areas of this map unit, Astatula-Apopka fine sands, 0 to 5 percent slopes, and soils that are similar make up 84 to 99 percent of the mapped areas. Dissimilar soils make up 1 to 16 percent of the mapped areas. Generally, the mapped areas consist of about 65 percent Astatula and similar soils and 22 percent Apopka and similar soils. The individual areas of the soils in this map unit are so intricately mixed that it is not practical to map separately at the selected scale. However, proportions and soil patterns are relatively consistent in most delineations of the map unit.

Typically, Astatula soil has a surface layer of grayish brown fine sand about 4 inches thick. The underlying material to a depth of about 80 inches is very pale brown fine sand. In the mapped areas are soils that are similar to Astatula fine sand, but they have lamellae or spodic bodies in the lower part of the underlying material.

Typically, Apopka soil has a surface layer of gray fine sand about 3 inches thick. The subsurface layer extends to a depth of about 64 inches. It is pale brown fine sand in the upper part and is very pale brown fine sand in the lower part. The subsoil to a depth of about 80 inches is yellowish brown sandy clay loam. In the mapped areas are soils that are similar to Apopka fine sand, but they have a subsoil within 20 to 40 inches of the surface.

The soils in this map unit have a seasonal high water table at a depth of more than 80 inches. The permeability of Astatula soil is very rapid. The permeability of Apopka soil is rapid to a depth of 64 inches and is moderate between depths of 64 and 80 inches. The available water capacity is very low in Astatula soil. In Apopka soil, it is very low to a depth of about 64 inches and is moderate in the subsoil. Natural fertility and the content of organic matter are low in Astatula and Apopka soils.

Dissimilar soils included in mapping are Tavares and Pomello soils in small areas. Also included are soils that are more wet than Astatula and Apopka soils and have a dark stained subsoil at a depth of 50 inches or more.

The soils in this map unit are used mainly for homesites and other urban development. They are also used as rangeland and pasture or have been left in natural vegetation. A small acreage is used for citrus crops. The natural vegetation consists of bluejack oak, Chapman oak, laurel oak, turkey oak, scattered live oak, slash pine, and longleaf pine. The understory includes dogfennel, eastern bracken, grassleaf goldaster, lopsided indiangrass, dwarf huckleberry, creeping bluestem, and pineland threeawn.

The soils in this map unit are generally not suited to most cultivated crops because of droughtiness and the rapid leaching of plant nutrients. These soils are well suited to citrus crops in areas that are relatively free of freezing temperatures (fig. 7). A ground cover of close-growing plants between tree rows reduces the hazard of erosion. A specially designed and properly managed irrigation system helps to maintain optimum soil moisture and ensure maximum yields. Frequent applications of fertilizer and lime are generally needed to maintain yields.

The soils in this map unit are moderately well suited to use as pasture. The available water capacity limits the production of plants during extended dry periods. Deep-

Figure 7.—A citrus grove on Astatula-Apopka fine sands, 0 to 5 percent slopes. In areas that are relatively free of freezing temperatures, these soils are well suited to citrus crops. The small trees in the left foreground are replacement trees that were planted following the January 1985 freeze.

rooted plants, such as Coastal bermudagrass and bahiagrass, are more drought tolerant if properly fertilized and limed. Proper stocking, pasture rotation, and timely deferment of grazing help keep the pasture in good condition.

The soils in this map unit are well suited to use as homesites and other urban development. They have few limitations. Population growth has resulted in increased construction of houses. If the density of housing is moderate or high, a community sewage system is needed to prevent contamination of water supplies by seepage. The proximity to a stream or canal should be considered in the placement of a septic tank absorption field to prevent lateral seepage and ground water pollution.

These soils are poorly suited to sewage lagoons, sanitary landfills, and shallow excavations. The main limitations are seepage, cutbanks caving, and sandy texture. Sealing or lining sewage lagoons and landfills with impervious material reduces excessive seepage. Sidewalls of shallow excavations should be shored.

If these soils are used for recreational development, the main limitation is droughtiness. During dry periods, irrigation is needed to maintain lawns and landscaping. The sandy surface layer should be stabilized and an adequate plant cover should be maintained.

These soils are poorly suited to use as habitat for openland and woodland wildlife. They are not suited to habitat for wetland wildlife.

Common wildlife in the county includes the fox squirrel, deer, quail, ground dove, towhee, gopher tortoise, pocket gopher, and fence lizard. So much of this community has been converted to citrus groves or urban development that this habitat for wildlife and several species dependent upon it are considered endangered.

Astatula soil is in capability subclass VIs. The woodland ordination symbol for this soil is 3S. Apopka soil is in capability subclass IIIs. The woodland ordination symbol for this soil is 10S. The soils in this map unit are in the Longleaf Pine-Turkey Oak Hills range site.

7—Astatula-Apopka fine sands, 5 to 8 percent slopes. The soils in this map unit are sloping, excessively drained and well drained. Astatula soil is excessively drained, and Apopka soil is well drained. These soils are on hillsides on the uplands. The slopes are smooth to convex.

In 90 percent of the areas of this map unit, Astatula-Apopka fine sands, 5 to 8 percent slopes, and soils that are similar make up 77 to 99 percent of the mapped area. Dissimilar soils make up about 1 to 23 percent of the mapped areas. Generally, the mapped areas consist of about 63 percent Astatula soil and similar soils and 27 percent Apopka soil and similar soils. The individual areas of the soils in this map unit are so intricately mixed that it is not practical to map separately at the selected scale. However, proportions and soil patterns are relatively consistent in most delineations of the map unit.

Typically, Astatula soil has a surface layer of gray fine sand about 3 inches thick. The next layer, to a depth of about 6 inches, is light yellowish brown fine sand. The underlying material extends to a depth of about 80 inches. It is pale brown fine sand in the upper part and is very pale brown fine sand in the lower part. In the mapped areas are soils that are similar to Astatula fine sand, but they have lamellae in the lower part of the underlying material or have a thick, dark color surface layer.

Typically, Apopka soil has a surface layer of gray fine sand about 6 inches thick. The upper part of the subsurface layer, to a depth of about 20 inches, is yellow fine sand. The lower part, to a depth of 65 inches, is very pale brown fine sand with a few lamellae. The subsoil to a depth of about 80 inches is reddish yellow sandy clay loam. In the mapped areas are soils that are similar to Apopka fine sand, but they have a subsoil that is within 20 to 40 inches of the surface.

The soils in this map unit have a seasonal high water table at a depth of more than 80 inches. The permeability of Astatula soil is very rapid. The permeability of Apopka soil is rapid to a depth of 65 inches and is moderate between depths of 65 and 80 inches. The available water capacity is very low in Astatula soil. In Apopka soil, it is very low to a depth of about 65 inches and is moderate below that depth. Natural fertility and the content of organic matter are low in Astatula and Apopka soils.

Dissimilar soils included in mapping are Millhopper and Tavares soils in small areas.

The soils in this map unit are used mainly for homesites and other urban development. They are also used as rangeland and pasture or have been left in natural vegetation. A small acreage is used for citrus crops. The natural vegetation consists mostly of bluejack oak, Chapman oak, laurel oak, turkey oak, scattered live oak, slash pine, and longleaf pine. The understory includes dogfennel, eastern bracken, grassleaf goldaster, lopsided indiangrass, dwarf huckleberry, creeping bluestem, and pineland threeawn.

The soils in this map unit are generally not suited to most cultivated crops because of droughtiness and the rapid leaching of plant nutrients. These soils are well suited to citrus crops in areas that are relatively free of freezing temperatures. A ground cover of close-growing plants between tree rows reduces the hazard of erosion. A specially designed and properly managed irrigation system helps to maintain optimum soil moisture and ensure maximum yields. Frequent applications of fertilizer and lime are generally needed.

The soils in this map unit are moderately well suited to use as pasture. The available water capacity limits the production of plants during extended dry periods. Deep-rooted plants, such as Coastal bermudagrass and bahiagrass, are more drought tolerant if properly fertilized and limed. Proper stocking, pasture rotation, and timely deferment of grazing help keep the pasture in good condition.

The soils in this map unit are well suited to use as homesites. They have few limitations. If these soils are used for commercial development, slope is the main limitation. Land shaping may be necessary in the more sloping areas. Population growth has resulted in increased construction of houses. If the density of housing is moderate or high, a community sewage system is needed to prevent contamination of water supplies by seepage. The proximity to a stream or canal should be considered in the placement of a septic tank absorption field to prevent lateral seepage and ground water pollution.

These soils are poorly suited to use for sewage lagoons, sanitary landfills, and shallow excavations. The main limitations are seepage, cutbanks caving, and sandy texture. Sealing or lining of sewage lagoons and landfills with impervious material reduces excessive seepage. Sidewalls of shallow excavations should be shored.

If these soils are used for recreational development, the main limitation is droughtiness. During dry periods, irrigation is needed to maintain lawns and landscaping. The sandy surface layer should be stabilized and an adequate plant cover should be maintained.

The soils in this map unit are poorly suited to use as habitat for openland and woodland wildlife. They are not suited to use as habitat for wetland wildlife.

Common wildlife in the county includes the fox squirrel, deer, quail, ground dove, towhee, gopher tortoise, pocket gopher, and fence lizard. So much of this community has been converted to citrus groves or urban development that this habitat for wildlife and several species dependent upon it are considered endangered.

Astatula soil is in capability subclass VIs. The woodland ordination symbol for this soil is 3S. Apopka soil is in capability subclass IVs. The woodland ordination symbol for this soil is 10S. The soils in this map unit are in the Longleaf Pine-Turkey Oak Hills range site.

8—Astatula-Apopka fine sands, 8 to 12 percent slopes. The soils in this map unit are strongly sloping and excessively drained and well drained. Astatula soil is excessively drained, and Apopka soil is well drained. These soils are on hillsides on the uplands. The slopes are short and complex.

In 95 percent of the areas of this map unit, Astatula-Apopka fine sands, 8 to 12 percent slopes, and soils that are similar make up 90 to 99 percent of the mapped areas. Dissimilar soils make up about 1 to 10 percent of most mapped areas. Generally, the mapped areas consist of about 72 percent Astatula soil and similar soils and 25 percent Apopka soil and similar soils. The individual areas of the soils in this map unit are so intricately mixed that mapping them separately at the selected scale is not practical. However, proportions and soil patterns are relatively consistent in most delineations of the map unit.

Typically, Astatula soil has a surface layer of light gray fine sand about 3 inches thick. The underlying material to a depth of about 80 inches is very pale brown fine sand. In the mapped areas are soils that are similar to Astatula fine sand, but they have lamellae in the lower part of the underlying material.

Typically, Apopka soil has a surface layer of dark gray fine sand about 4 inches thick. The subsurface layer extends to a depth of about 65 inches. It is very pale brown fine sand in the upper part, and the lower part is very pale brown fine sand with a few thin lamellae. The subsoil to a depth of about 80 inches is brownish yellow sandy clay loam. In the mapped areas are soils that are similar to Apopka fine sand, but they have a subsoil within 20 to 40 inches of the surface.

The soils in this map unit have a seasonal high water table at a depth of 80 inches. The permeability of Astatula soil is very rapid. The permeability of Apopka soil is rapid to a depth of 65 inches and moderate between depths of 65 and 80 inches. The available water capacity is very low in Astatula soil. In Apopka soil, it is very low to a depth of 65 inches and is moderate below that depth. Natural fertility and content of organic matter are low in Astatula and Apopka soils.

Dissimilar soils included in mapping are Millhopper soils in small areas.

The soils in this map unit are used mainly for homesites and other urban development. They are also used as rangeland and pasture or have been left in natural vegetation. The natural vegetation consists mostly of bluejack oak, Chapman oak, laurel oak, turkey oak, scattered live oak, slash pine, and longleaf pine. The understory includes dogfennel, eastern bracken, grassleaf goldaster, lopsided indiangrass, dwarf huckleberry, creeping bluestem, and pineland threeawn.

The soils in this map unit are generally not suited to most cultivated crops because of droughtiness and the rapid leaching of plant nutrients. These soils are well suited to citrus crops in areas that are relatively free of freezing temperatures. A ground cover of close-growing plants between tree rows reduces the hazard of erosion. A specially designed and properly managed sprinkler irrigation system helps to maintain optimum soil moisture and ensure maximum yields. Frequent applications of fertilizer and lime are generally needed to maintain yields.

The soils in this map unit are moderately well suited to use as pasture. The available water capacity limits the production of plants during extended dry periods. Deep-rooted plants, such as Coastal bermudagrass and bahiagrass, are more drought tolerant if properly fertilized and limed. Proper stocking, pasture rotation, and timely deferment of grazing help keep the pasture in good condition.

The soils in this map unit are moderately well suited to use for homesites and small commercial buildings. The main limitation is slope. Land shaping may be necessary in the more sloping areas. Population growth has resulted in increased construction of houses. If the density of housing is moderate or high, a community sewage system is needed to prevent contamination of water supplies by seepage. The proximity to a stream or canal should be considered in the placement of a septic tank absorption field to prevent lateral seepage and ground water pollution. The steepness of slope is a concern in installing septic tank absorption fields. Lateral lines should be constructed on the contour. Erosion is a hazard in the steeper areas. Only the part of the site that is used for construction should be disturbed. Preserving the existing plant cover during construction helps to control erosion. Establishing and maintaining plant cover can be achieved by fertilizing, seeding, mulching, and shaping of the slopes.

These soils are poorly suited to use for sewage lagoons, sanitary landfills, and shallow excavations. The main limitations are seepage, cutbanks caving, sandy texture, and slope. Sealing or lining of sewage lagoons and landfills with impervious material reduces excessive seepage. Sidewalls of shallow excavations should be shored.

If these soils are used for recreational development, the main limitation is droughtiness. During dry periods, irrigation is needed to maintain lawns and landscaping. The sandy surface layer should be stabilized and an adequate plant cover should be maintained.

The soils in this map unit are poorly suited to use as habitat for openland and woodland wildlife. These soils are not suited to use as habitat for wetland wildlife.

Common wildlife in the county includes the fox squirrel, deer, quail, ground dove, towhee, gopher tortoise, pocket gopher, and fence lizard. So much of this community has been converted to citrus groves or urban development that this habitat for wildlife and several species dependent upon it are considered endangered.

Astatula soil is in capability subclass VIs. The woodland ordination symbol for this soil is 3S. Apopka soil is in capability subclass IVs. The woodland ordination symbol for this soil is 10S. The soils in this map unit are in the Longleaf Pine-Turkey Oak Hills range site.

9—Basinger and Delray fine sands. The soils in this map unit are nearly level and poorly drained and very poorly drained. Basinger soil is poorly drained and Delray soil is very poorly drained. These soils are in sloughs and poorly defined drainageways. The slopes are dominantly less than 2 percent.

In 90 percent of the areas of this map unit, Basinger and Delray fine sands and soils that are similar make up 80 to 99 percent of the mapped areas. Dissimilar soils make up about 1 to 20 percent of most mapped areas. Generally, the mapped areas consist of about 60 percent Basinger soil and similar soils and 32 percent Delray soil and similar soils. Some areas are made up of Basinger soil and similar soils, some are made up of Delray soil and similar soils, and some areas are made up of both of these soils. They do not occur in a regular repeating pattern. The relative proportion of combinations of the soils vary. The individual areas of the soils in this map unit are large enough to map separately; however, in considering the present and predicted use, they were mapped as one map unit.

Typically, Basinger soil has a surface layer of very dark gray fine sand about 5 inches thick. The subsurface layer, to a depth of about 30 inches, is light gray fine sand. The subsoil, to a depth of about 50 inches, is dark grayish brown and light gray fine sand that has common weakly cemented bodies. The substratum to a depth of about 80 inches is gray fine sand. In the mapped areas are soils similar to Basinger soil, but they have a dark color subsoil within 20 inches of the surface.

Typically, Delray soil has a surface layer of black fine sand about 12 inches thick. The subsurface layer, to a depth of about 50 inches, is light gray fine sand. The subsoil to a depth of 80 inches is gray sandy loam. In the mapped areas are soils that are similar to Delray soil, but they do not have a loamy subsoil, or they have a subsoil that is within 20 to 40 inches of the surface.

In most years, the soils in this map unit have a seasonal high water table within 12 inches of the surface for 6 months or more. The permeability of Basinger soil is rapid. The permeability of Delray soil is rapid in the upper part and moderate in the lower part. The available water capacity is low in Basinger soil. In Delray soil, the available water capacity is moderate in the surface layer and subsoil and low in the subsurface layer. Natural fertility and the content of organic matter are low in Basinger soil, and they are moderate in Delray soil. The surface layer of Basinger and Delray soils remains wet for long periods after heavy rains.

Dissimilar soils included in mapping are Wabasso and Malabar soils in small areas.

In most areas, the soils in this map unit have been left in natural vegetation or have been cleared and used as rangeland and pasture. Some areas have been drained and are used for cultivated crops. The natural vegetation consists mostly of cabbage palm, scattered live and laurel oaks, sweetgum, and slash and longleaf pines. Some areas are dominated by maidencane, giant cutgrass, sawgrass, and rushes.

The soils in this map unit are generally not suited to cultivated crops and citrus crops because of excessive wetness. A water control system should be established and maintained, such as dikes, ditches, and pumps.

These soils are fairly well suited to truck crops and other speciality crops; however, an adequate drainage system is needed. Ditches and tile drains can be used to lower the high water table. Frequent applications of fertilizer and lime are generally needed to maintain yields.

If a water control system is established and maintained, the soils in this map unit are well suited to use as pasture. Wetness limits the choice of plants that can be grown on these soils and restricts grazing during periods of excessive wetness. Grazing when the soil is wet results in compaction of the surface layer and damage to the plant community. Proper stocking, pasture rotation, and timely deferment of grazing help keep the pasture in good condition. Fertilizer and lime are needed for optimum growth of grasses and legumes.

The soils in this map unit are poorly suited to use for homesites and other urban development. The main limitation is wetness. To overcome wetness, a water control system is needed to provide for subsurface drainage and to remove excess surface water. Fill material should be added to make these soils suitable for most urban uses. Septic tank absorption fields do not function properly during rainy periods because of wetness.

These soils are poorly suited to use for sewage lagoons or sanitary landfills. The main limitations are seepage and wetness. These limitations are generally costly to overcome.

If these soils are used for recreational development, the main limitation is wetness. Good drainage is needed on paths and trails. Erosion and sedimentation can be controlled and the area can be enhanced by maintaining adequate plant cover.

The soils in this map unit are poorly suited to use as habitat for openland and woodland wildlife. These soils are moderately suited to use as habitat for wetland wildlife.

Common wildlife in the county includes deer, turkeys, armadillos, skunks, sparrows, quail, woodpeckers, warblers, rattlesnakes, frogs, and bobcat. Rotational grazing, controlled burning, and maintenance of natural water levels can improve habitat for wildlife.

Basinger soil is in capability subclass IVw. The woodland ordination symbol for this soil is 8W. Delray soil is in capability subclass IIIw. The woodland ordination symbol for this soil is 11W. The soils in this map unit are in the Slough range site.

10—Basinger, Samsula, and Hontoon soils, depressional. The soils in this map unit are nearly level and very poorly drained. These soils are in swamps and depressions. The slopes are dominantly less than 2 percent.

In 90 percent of the areas of this map unit, Basinger, Samsula, and Hontoon soils, depressional, and soils that are similar make up 76 to 93 percent of the mapped areas. Dissimilar soils make up about 7 to 24 percent of the mapped areas. Generally, the mapped areas consist of about 58 percent Basinger soil and similar soils, 15 percent Samsula soil and similar soils, and 12 percent Hontoon soil and similar soils. Some areas are made up of Basinger soil and similar soils, some are made up of Samsula soil and similar soils, some are made up of Hontoon soil and similar soils, and some areas are made up of all of these soils. They do not occur in a regular repeating pattern. The relative proportion of combinations of the soils vary. The individual areas of the soils in this map unit are large enough to map separately; however, in considering the present and predicted use, they were mapped as one map unit.

Typically, Basinger soil has a surface layer of very dark gray mucky fine sand about 6 inches thick. The subsurface layer, to a depth of about 18 inches, is light gray fine sand. The subsoil, to a depth of about 35 inches, is dark grayish brown and light brownish gray fine sand. The substratum to a depth of about 80 inches is light gray fine sand. In the mapped areas are soils that are similar to Basinger soil, but they have a thick dark surface layer, they do not have a brownish color subsurface layer, or they have a yellow or yellowish brown subsurface layer.

Typically, Samsula soil has a surface layer of muck about 30 inches thick. It is dark reddish brown in the upper part and black in the lower part. Below that layer, to a depth of about 45 inches, is dark gray fine sand. The underlying material to a depth of about 80 inches is gray fine sand. In the mapped areas are soils that are similar to Samsula soil, but the organic material in these soils is less decomposed than that in the Samsula soil, or it is less than 16 inches thick.

Typically, Hontoon soil has a surface layer of dark reddish brown muck about 18 inches thick. The next layer, to a depth of about 48 inches, is very dark brown muck. The lower layer to a depth of about 80 inches is black muck. In the mapped areas are soils that are similar to Hontoon soil, but the organic material in these soils is less decomposed than that in the Hontoon soil.

In most years, the undrained areas of the soils in this map unit are ponded for 6 to 9 months or more. If drained, the organic material in Samsula and Hontoon soils initially shrinks and then subsides further as a result of compaction and oxidation. These losses are more rapid during the first 2 years. If the soils in this map unit are drained, organic material continues to subside at the rate of about 1 inch per year. The lower the water table, the more rapid the loss. The permeability is rapid in Basinger, Samsula, and Hontoon soils. The available water capacity is low in Basinger soil. It is very high in the organic material of Samsula and Hontoon soils and is very low in the sandy part of Samsula soil.

Dissimilar soils included in mapping are EauGallie, Floridana, Smyrna, Myakka, St. Johns, Felda, and Holopaw soils in small areas. EauGallie, Floridana, Felda, and Holopaw soils have a loamy subsoil. Smyrna, Myakka, and St. Johns soils have a sandy subsoil.

In most areas, the soils in this map unit have been left in natural vegetation. Some areas have been drained and are used as rangeland and pasture. Other areas have been filled and are used for homesites or other urban development. The natural vegetation consists mostly of mixed stands of cypress, red maple, sweetgum, cabbage palm, sweetbay, and blackgum. The understory includes cutgrass, maidencane, Jamaica sawgrass, sedges, ferns, and other water-tolerant grasses.

The soils in this map unit are generally not suited to most cultivated crops and citrus crops because of ponding and excessive wetness. An adequate drainage system is needed in most areas to remove excess surface water and to reduce soil wetness, but suitable outlets generally are not available. However, if intensive management practices and soil-improving measures are used and a water control system is installed to remove excess water rapidly, these soils have fair suitability for some vegetable crops. Management practices should include seedbed preparation and crop rotation. Crop residue left on or in the soil and a cropping system that includes grasses, legumes, or a grass-legume mixture help to maintain fertility and tilth. Most crops and pasture plants respond well to fertilization.

The soils in this map unit are poorly suited to use as pasture; however, if a water control system is installed to remove excess surface water after a heavy rain, suitability is fair. Pangolagrass, improved bahiagrass, and white clover grow well on these soils. Maintaining the high water table close to the surface reduces excessive oxidation of the organic layers. Proper grazing practices, weed control, and fertilizer are needed to obtain high quality forage. Proper stocking, pasture rotation, and restricted grazing during wet periods help to keep the pasture and the soil in good condition.

In their natural state, the soils in this map unit are not suited to use for homesites, commercial or recreational development, or sanitary facilities. The main limitations are ponding, excess humus, low strength, and subsidence.

The soils in this map unit are not suited to use as habitat for openland wildlife. They are poorly suited to use as habitat for woodland wildlife and are well suited to use as habitat for wetland wildlife.

Common wildlife in the county includes the otter, raccoon, gray squirrel, wood duck, limpkin, and alligator. In addition, animals in surrounding habitats often use these areas for food and cover and as travel lanes between developed areas.

The soils in this map unit are in capability subclass VIIw. The woodland ordination symbol for these soils is 2W. These soils are in the Freshwater Marshes and Ponds range site.

11—Basinger and Smyrna fine sands, depressional. The soils in this map unit are are nearly level and very poorly drained. These soils are in depressions. The slopes are dominantly less than 2 percent.

In 95 percent of the areas of this map unit, Basinger and Smyrna fine sands, depressional, and soils that are similar make up 83 to 98 percent of the mapped areas. Dissimilar soils make up about 2 to 17 percent of the mapped areas. Generally, the mapped areas consist of about 63 percent Basinger soil and similar soils and 28 percent Smyrna soil and similar soils. Some areas are made up of Basinger soil and similar soils, some are made up of Smyrna soil and similar soils, and some areas are made up of both of these soils. They do not occur in a regular repeating pattern. The relative proportion of combinations of the soils vary. The individual areas of the soils in this map unit are large enough to map separately; however, in considering the present and predicted use, they were mapped as one map unit.

Typically, Basinger soil has a surface layer of black mucky fine sand about 5 inches thick. The subsurface layer, to a depth of about 15 inches, is light gray fine sand. The subsoil, to a depth of about 25 inches, is dark grayish brown and light gray fine sand. The substratum to a depth of about 80 inches is grayish brown fine sand. In the mapped areas are soils that are similar to Basinger soil, but they do not have a mixed, dark grayish brown and light gray subsoil, or they have a subsoil that is yellow or brownish yellow.

Typically, Smyrna soil has a surface layer of black fine sand about 2 inches thick. The subsurface layer, to a depth of about 15 inches, is light gray fine sand. The upper part of the subsoil, to a depth of about 17 inches, is very dark grayish brown fine sand. The lower part, to a depth of about 25 inches, is dark brown fine sand that has distinct black mottles. The upper part of the substratum, to a depth of about 40 inches, is light yellowish brown fine sand. The lower part to a depth of about 80 inches is light gray and gray fine sand. In the mapped areas are soils that are similar to Smyrna soil, but they have a thick, dark surface layer or have a subsoil that is at a depth of 30 to 50 inches of the surface.

In most years, undrained areas of the soils in this map unit are ponded for 6 to 9 months. The permeability of Basinger soil is rapid. The permeability of Smyrna soil is rapid in the surface and subsurface layers, moderate or moderately rapid in the subsoil, and rapid in the substratum. The available water capacity is low in Basinger soil. The available water capacity is low in the surface and subsurface layers, high in the subsoil, and low in the substratum in Smyrna soil. Natural fertility and the content of organic matter are low in Basinger and Smyrna soils.

Dissimilar soils included in mapping are EauGallie and Malabar soils in small areas.

In most areas, the soils in this map unit have been left in natural vegetation. Some areas have been drained and are used as rangeland and pasture. The natural vegetation consists of mixed stands of cypress, sweetgum, blackgum, and scattered pond pine. The understory includes chalky bluestem, blue maidencane, and other water-tolerant grasses and sedges.

The soils in this map unit are generally not suited to most cultivated crops and citrus crops because of ponding and excessive wetness. An adequate drainage system is needed in most areas to remove excess surface water and to reduce soil wetness, but suitable outlets generally are not available. However, if intensive management practices and soil-improving measures are used and a water control system is installed to remove excess water rapidly, these soils are fairly suited to some vegetable crops. Management practices, such as crop rotation and seedbed preparation that include bedding of rows, are needed. Crop residue left on or in the soil and a cropping system that includes grasses, legumes, or a grass-legume mixture help to maintain fertility and tilth. Most crops and pasture plants respond well to fertilization.

The soils in this map unit are poorly suited to pasture. The main limitations are ponding and excessive wetness. Wetness limits the choice of plants that can be grown on these soils. It also restricts grazing during periods of excessive wetness. Proper stocking, pasture rotation, and restricted grazing during wet periods help keep the pasture and the soil in good condition.

In their natural state, the soils in this map unit are not suited to use for homesites, commercial and recreational development, or sanitary facilities. The main limitations are ponding and seepage.

The soils in this map unit are not suited to use as habitat for openland wildlife. They are very poorly suited to use as habitat for woodland wildlife and are well suited to use as habitat for wetland wildlife.

Many animals that are native to Seminole County use these areas for at least part of their life cycle. Common wildlife in the county includes wading birds, waterfowl, fish, frogs, snakes, turtles, otters, and raccoons.

The soils in this map unit are in capability subclass VIIw. The woodland ordination symbol for these soils is 2W. These soils are in the Freshwater Marshes and Ponds range site.

12—Canova and Terra Ceia mucks. The soils in this map unit are level and very poorly drained. These soils are in depressions and freshwater marshes. The slopes are dominantly less than 1 percent.

This map unit consists of about 75 percent Canova soil and soils that are similar and about 25 percent Terra Ceia soil and soils that are similar. Some areas are made up mostly of Canova soil and similar soils, some are made up mostly of Terra Ceia soil and similar soils, and other areas are made up of substantial amounts of both of these soils. They do not occur in a regular repeating pattern. The relative proportion of combinations of the soils vary. The individual areas of soils in this map unit are large enough to map separately; however, in considering the present and predicted use, they were mapped as one map unit.

Typically, Canova soil has a surface layer of black muck about 10 inches thick. Below that layer, to a depth of about 15 inches, is black fine sand. The subsurface layer, to a depth of about 27 inches, is gray fine sand. The upper part of the subsoil, to a depth of about 30 inches, is dark gray sandy loam that is mottled and has tongues of the overlying sandy material extending into it. The middle part, to a depth of about 38 inches, is dark greenish gray sandy clay loam. The lower part to a depth of about 80 inches is greenish gray sandy clay loam. This part contains common lenses of sandy material and common light gray carbonatic material. In the mapped areas are soils that are similar to Canova soil, but they do not have a muck surface.

Typically, Terra Ceia soil has a surface layer of black muck about 7 inches thick. The next layer to a depth of about 80 inches is very dark brown muck. In the mapped areas are soils that are similar to Terra Ceia soil, but they have loamy material within 51 inches of the surface.

In most years, undrained areas of the soils in this map unit are ponded for 6 to 9 months or more. Most areas are artificially drained through drainage tiles and surface ditches. In drained areas, the water table is controlled at a depth of 10 to 36 inches or is controlled according to the needs of the crop. Terra Ceia and Canova soils have high subsidence potential. If drained, the organic material in these soils initially shrinks on drying and then subsides further as a result of compaction and oxidation. These losses are more rapid during the first 2 years. If the soils in this map unit are drained, the organic material continues to subside at the rate of about 1 inch per year. The lower the water table, the more rapid the loss.

The permeability is rapid in the upper part of Canova soil and is moderate or moderately rapid in the lower part. The permeability of Terra Ceia soil is rapid, but internal drainage is impeded by the shallow water table. The available water capacity is high in the organic surface layer in Canova soil, is very low in the sandy surface layer, and is moderate in the subsoil and substratum. The available water capacity is very high in Terra Ceia soil. Natural fertility is medium in Canova soil and high in Terra Ceia soil. The content of organic matter is high in Canova soil and very high in Terra Ceia soil.

In most areas, the soils in this map unit have been drained and are used for cultivation of truck crops, which include celery, cabbage, and watercress (fig. 8); and some areas are used for improved pasture. The natural vegetation consists of Carolina willow, primrose willow, buttonbush, cattail, blue maidencane, Jamaica sawgrass, and other water-tolerant grasses. In a few areas, the natural vegetation consists of cypress and swamp hardwoods.

Areas without water control are not suited to cultivation. If a water control system is established and maintained that includes dikes, ditches, and pumps, the soils in this map unit are well suited to many vegetable crops and also to growing watercress. A specially designed water control system is needed to remove the excess water when crops are on the soil and to maintain the water table near the surface to prevent subsidence during periods of nonuse. Proper row management, lateral ditches or tiles, and well constructed outlets help to remove the excess surface water. Tile drainage can be used to lower the water table if suitable outlets are available. Soil-improving crops and crop residue left on or in the soil reduce the hazard of erosion and maintain the content of organic matter. Fertilizer and lime should be applied according to the needs of the crop.

If a water control system is established and maintained, the soils in this map unit are moderately well suited to pasture. Wetness limits the period of grazing. Excess surface water can be removed from most areas by field drains. The water control system should maintain the water table near the surface to prevent excess subsidence of the organic material. Proper stocking, pasture rotation, and restricted grazing during wet

Figure 8.—This field of watercress is growing on Canova and Terra Ceia mucks.

periods help keep the pasture and the soil in good condition. Fertilizer and lime are needed for optimum growth of grasses and legumes.

In their natural state, the soils in this map unit are not suited to use for homesites, commercial and recreational development, or sanitary facilities. The main limitations are ponding, subsidence, excess humus, and seepage.

The soils in this map unit are moderately suited to use as habitat for openland wildlife. They are not suited to use as habitat for woodland wildlife and are well suited to use as habitat for wetland wildlife.

Many animals that are native to Seminole County use these areas for at least part of their life cycle. Common wildlife in the county includes wading birds, waterfowl, fish, frogs, snakes, turtles, otters, and raccoons.

The soils in this map unit are in capability subclass IIIw, if drained, and in VIIw, if undrained. The woodland ordination symbol for these soils is 2W. The soils in this map unit are in the Freshwater Marshes and Ponds range site.

13—EauGallie and Immokalee fine sands. The soils in this map unit are nearly level and poorly drained. These soils are on broad plains on the flatwoods. The slopes are dominantly less than 2 percent.

In 80 percent of the areas of this map unit, EauGallie and Immokalee fine sands and soils that are similar make up 78 to 99 percent of the mapped areas. Dissimilar soils make up about 1 to 22 percent of most mapped areas. Generally, the mapped areas consist of about 56 percent EauGallie soil and about 35 percent Immokalee soil and similar soils. Some areas are made up of EauGallie soil, some are made up of Immokalee soil and similar soils, and some areas are made up of both of these soils. They do not occur in a regular repeating pattern. The relative proportion of combinations of the soils vary. The individual areas of the soils in this map unit are large enough to map separately; however, in considering the present and predicted use, they were mapped as one map unit.

Typically, EauGallie soil has a surface layer of very dark gray fine sand about 6 inches thick. The subsurface layer, to a depth of about 24 inches, is light gray fine sand. The upper part of the subsoil, to a depth of about 54 inches, is black, very dark grayish brown, and pale brown fine sand. The lower part to a depth of about 80 inches is gray sandy loam.

Typically, Immokalee soil has a surface layer of dark gray fine sand about 4 inches thick. The upper part of the subsurface layer, to a depth of about 7 inches, is gray fine sand. The lower part, to a depth of about 42 inches, is light gray fine sand. The upper part of the subsoil, to a depth of about 62 inches, is black fine sand. The lower part to a depth of about 80 inches is dark yellowish brown fine sand. In the mapped areas are soils that are similar to Immokalee fine sand, but these soils have a subsoil within 30 inches of the surface or at a depth of more than 50 inches.

The soils in this map unit have a seasonal high water table within 12 inches of the surface for 1 to 4 months during most years. The permeability of EauGallie soil is rapid in the surface and subsurface layers, moderate or moderately rapid in the sandy part of the subsoil, and moderately slow in the loamy part. The permeability of Immokalee soil is rapid in the surface and subsurface layers and is moderate the subsoil. The available water capacity is very low in the surface and subsurface layers of the EauGallie soil and moderate in the subsoil. The available water capacity is very low in the surface and subsurface layers of Immokalee soil and is moderate to high in the subsoil. Natural fertility is low in EauGallie and Immokalee soils. The content of organic matter is moderate to moderately low in EauGallie soil and low in Immokalee soil.

Dissimilar soils included in mapping are Malabar soils in small areas.

In most areas, the soils in this map unit have been left in natural vegetation. In a few areas, these soils are used for cultivated crops and as rangeland and pasture. The natural vegetation consists mostly of longleaf and slash pines and scattered live and laurel oaks. The understory includes saw palmetto, running oak, inkberry, fetterbush, creeping bluestem, chalky bluestem, lopsided indiangrass, pineland threeawn, and waxmyrtle.

The soils in this map unit are generally not suited to most cultivated crops because of wetness and the sandy texture in the root zone. If a water control system is established and maintained and soil-improving measures are used, this soil is moderately suited to most cultivated crops. A water control system is needed to remove excess water in wet periods and to provide for subsurface irrigation in dry periods. Crop residue left on or in the soil and a cropping system that includes grasses, legumes, or a grass-legume mixture help to conserve moisture, to maintain fertility, and to control erosion. These soils are moderately well suited to citrus crops in areas that are relatively free of freezing temperatures. The main limitation is wetness. A properly managed water control system is needed to maintain the water table at an effective depth. Proper arrangement and bedding of rows, lateral ditches or tiles, and well constructed outlets help to remove excess surface water and to lower the water table. Frequent applications of fertilizer and lime are generally needed to maintain yields.

The soils in this map unit are well suited to use as pasture. A water control system is needed to remove excessive surface water. Pangolagrass, improved bahiagrass, and white clover grow well on these soils. Proper stocking, pasture rotation, and restricted grazing during wet periods help keep the pasture and the soil in good condition. Fertilizer and lime are needed for optimum growth of grasses and legumes.

The soils in this map unit are poorly suited to use for sanitary facilities, building sites, or recreational development. The main limitations are seepage and wetness. Water control, including drainage outlets, is needed to overcome wetness. Fill material should be added to make these soils suitable for most urban use. Septic tank absorption fields may not function properly during rainy periods because of wetness. Septic tank absorption fields are mounded in most areas because of the high water table. If the density of housing is moderate or high, a community sewage system may be needed to prevent contamination of water supplies by seepage. Sealing or lining of sanitary landfills with impervious soil material reduces excess seepage. Sidewalls of shallow excavations should be shored. The sandy surface layer should be stabilized for recreational use.

The soils in this map unit are poorly suited to use as habitat for openland, woodland, and wetland wildlife.

Common wildlife in the county includes deer, turkeys, armadillos, skunks, sparrows, quail, woodpeckers, warblers, rattlesnakes, frogs, and bobcats. Rotational grazing, controlled burning, and maintenance of natural water levels can improve habitat for wildlife.

The soils in this map unit are in capability subclass IVw. The woodland ordination symbol for EauGallie soil is 10W and is 8W for Immokalee soil. These soils are in the South Florida Flatwoods range site.

14—Felda mucky fine sand, saline, frequently flooded. This soil is nearly level and is poorly drained. It is on the flood plains and is frequently flooded for very long periods following prolonged, high intensity rains. The slopes are dominantly less than 2 percent.

This map unit consists of about 90 percent Felda soil and about 10 percent of soils that are similar to Felda soil.

Typically, this soil has a surface layer of black mucky fine sand about 7 inches thick. The subsurface layer, to a depth of about 25 inches, is gray and light gray fine sand. The upper part of the subsoil, to a depth of about 39 inches, is gray sandy clay loam. The lower part, to a depth of about 49 inches, is gray sandy loam that has common lenses and pockets of fine sand and loamy fine sand. The substratum to a depth of about 80 inches is gray loamy sand. In the mapped areas are soils that are similar to Felda soil, but these soils have a surface layer that is 7 to 10 inches thick.

In most years, this soil has a seasonal high water table within 12 inches of the surface for 3 to 6 months or more. This soil is subject to frequent flooding for 1 month to 4 months or more during rainy periods. The permeability is rapid in the surface and subsurface layers, moderate or moderately rapid in the subsoil, and rapid in the substratum. The available water capacity is very low in the surface and subsurface layer and in the substratum and low in the subsoil. The concentration of salt in the lower part of the subsoil restricts root development and limits the amount of water available to plants. Natural fertility is low, and the content of organic matter is moderate.

In most areas, this soil has been left in natural vegetation and is used as rangeland. The natural vegetation consists of seashore dropseed, seashore paspalum, switchgrass, and seashore saltgrass. Other native plants include sand cordgrass, glasswort, and sea purslane.

This Felda soil generally is not suited to most cultivated crops, tame pasture grasses, and citrus crops because of wetness, content of salt, and flooding.

Under natural conditions, this soil is moderately well suited to rangeland. Applying heavy stock density when the soil is wet results in compaction of the surface layer and damage to the plant community. High concentration of salt in the subsoil on microsites within this map unit limits the production of plants that are suitable for the range. Proper stocking, rotational grazing, and restricted grazing during wet periods help keep the range site and the soil in good condition.

This soil is not suited to use as habitat for openland and woodland wildlife. It is well suited to use as habitat for wetland wildlife.

This soil is not suited to use for homesites, commercial and recreational development, or sanitary facilities. The main limitations are wetness and seepage. Flooding is a hazard.

This Felda soil is in capability subclass Vw. This soil has not been assigned a woodland ordination symbol. It is in the Salt Marsh range site.

15—Felda and Manatee mucky fine sands, depressional. The soils in this map unit are nearly level and very poorly drained. These soils are in depressions. Undrained areas are ponded. The slopes are dominantly less than 2 percent.

In 95 percent of the areas of this map unit, Felda and Manatee mucky fine sands, depressional, and soils that are similar make up 87 to 99 percent of the mapped areas. Dissimilar soils make up about 1 to 13 percent of the mapped areas. Generally, the mapped areas consist of about 56 percent Felda soil and similar soils and 38 percent Manatee soil and similar soils. Some areas are made up of Felda soil and similar soils, some are made up of Manatee soil and similar soils, and some areas are made up of both of these soils. They do not occur in a regular repeating pattern. The relative proportion of combinations of the soils vary. The individual areas of the soils in this map unit are large enough to map separately; however, in considering the present and predicted use, they were mapped as one map unit.

Typically, Felda soil has a surface layer of very dark grayish brown mucky fine sand about 4 inches thick. The subsurface layer, to a depth of about 28 inches, is light brownish gray and gray fine sand. The subsoil, to a depth of about 46 inches, is grayish brown sandy clay loam and gray loam fine sand. The substratum to a depth of about 80 inches is light gray fine sand. In the mapped areas are soils that are similar to Felda mucky fine sands, but these soils have a yellowish brown subsoil or have a surface layer that is 7 to 10 inches thick.

Typically, Manatee soil has a surface layer that is 19 inches thick. It is black mucky fine sand in the upper part and very dark gray loamy sand in the lower part. The subsoil extends to a depth of about 50 inches. It is dark gray sandy loam in the upper part and dark gray fine sandy loam in the lower part. The substratum to a depth of about 80 inches is gray loamy fine sand. In the mapped areas are soils that are similar to Manatee mucky fine sand, but these soils have a surface layer that is 7 to 10 inches thick, or they have a clayey subsoil.

In most years, undrained areas of the soils in this map unit are ponded for 6 to 9 months or more each year. The permeability of Felda soil is rapid in the surface and subsurface layers and in the subtratum and is moderate or moderately rapid in the subsoil. The permeability of Manatee soil is moderately rapid in the surface layer and is moderate in the subsoil. The available water capacity of Felda soil is low in all other layers except the subsoil where it is moderate. The available water capacity of Manatee soil is high in the surface layer and moderate in the subsoil. Natural fertility is low in Felda and Manatee soils. The content of organic matter is moderate in Felda soil and high in Manatee soil.

Dissimilar soils included in mapping are Delray and Wabasso soils in small areas.

In most areas, the soils in this map unit have been left in natural vegetation and are used as rangeland. In other areas, fill material has been added, and these areas are used for homesites or other urban development. The natural vegetation consists of mixed stands of cypress, red maple, sweetgum, blackgum, sweetbay, and cabbage palms. The understory includes cutgrass, maidencane, Jamaica sawgrass, sedges, ferns, and other water-tolerant grasses.

The soils in this map unit are generally not suited to most cultivated crops and citrus crops because of ponding and excessive wetness. An adequate drainage system is needed in most areas to remove excess surface water and to reduce soil wetness, but suitable outlets generally are not available. However, if intensive management practices and soil-improving measures are used and a water control system is installed to remove excess water rapidly, this map unit is fairly well suited to some vegetable crops. Management practices should include seedbed preparation and crop rotation. Crop residue left on or in the soil and a cropping system that includes grasses, legumes, or a grass-legume mixture help to maintain fertility and tilth. Most crops and pasture plants respond well to fertilization.

The soils in this map unit are poorly suited to use as pasture; however, they are fairly well suited to this use if a water control system is installed to remove excess surface water after heavy rains. Pangolagrass, improved bahiagrass, and white clover grow well on these soils. Proper grazing practices, weed control, and fertilizer are needed to obtain high quality forage. Proper stocking, pasture rotation, and restricted grazing during wet periods help keep the pasture and the soil in good condition.

In their natural state, the soils in this map unit are not suited to use for homesites, commercial or recreational development, or sanitary facilities. The main limitations are ponding and seepage.

The soils in this map unit are not suited to use as habitat for openland wildlife. They are very poorly suited to use as habitat for woodland wildlife and are well suited to use as habitat for wetland wildlife.

Common wildlife in the county includes the otter, raccoon, gray squirrel, wood duck, limpkin, and alligator. In addition, animals in surrounding habitats often use these areas for food and cover and as travel lanes between developed areas.

The soils in this map unit are in capability subclass VIIw. The woodland ordination symbol for these soils is 2W. They are in the Freshwater Marshes and Ponds range site.

16—Immokalee sand. This soil is nearly level and poorly drained. It is on broad plains on the flatwoods. The slopes are dominantly less than 2 percent.

In 95 percent of the areas of this map unit, Immokalee sand and soils that are similar make up 81 to 99 percent of the mapped areas. Dissimilar soils make up about 1 to 19 percent of the mapped areas.

Typically, this soil has a surface layer of dark gray sand about 6 inches thick. The subsurface layer extends to a depth of about 36 inches. It is light gray fine sand in the upper part and white fine sand in the lower part. The subsoil extends to a depth of about 56 inches. It is black fine sand in the upper part and dark brown fine sand in the lower part. The substratum to a depth of about 80 inches is brown fine sand. In the mapped areas are soils that are are similar to Immokalee sand but have a subsoil within 10 to 20 inches of the surface, or they do not have a subsoil.

During most years, this soil has a seasonal high water table within 12 inches and the surface for 1 month to 4 months. The permeability is rapid in the surface and subsurface layers and in the substratum and is moderate in the subsoil. The available water capacity is low in the surface layer, very low in the subsurface layer and substratum, and high in the subsoil. Natural fertility and the content of organic matter are low.

Dissimilar soils included in mapping are EauGallie soils in small areas. Also included are soils that are slightly better drained than Immokalee soil and have a subsoil at a depth of more than 50 inches.

In most areas, this soil has been left in natural vegetation. A few areas are used for cultivated crops and citrus crops, as rangeland and pasture, or for homesites and other urban development. The natural vegetation consists mostly of longleaf pine and slash pine and live oak and water oak. The understory includes saw palmetto, running oak, inkberry, fetterbush, creeping bluestem, lopsided indiangrass, pineland threeawn, chalky bluestem, and waxmyrtle.

Under natural conditions, this Immokalee soil is poorly suited to cultivated crops because of wetness and the sandy texture in the root zone. However, if a water control system is installed and soil-improving measures are used, this soil is fairly suited to many vegetable crops (fig. 9). If suitable drainage outlets are available, lateral ditches and tile drains can be used to lower the water table. Crop residue left on or near the surface reduces runoff and helps to maintain soil tilth and the content of organic matter. This soil is well suited to citrus crops in areas that are relatively free of freezing temperatures. An adequate drainage system is needed. Proper arrangement and bedding of rows, lateral ditches or tiles, and well constructed outlets help to remove excess surface water and to lower the water table. A ground cover of close-growing plants between tree rows reduces the hazard of erosion. Frequent applications of fertilizer and lime are generally needed.

This soil is well suited to pasture. If a water control system is established and maintained, the excessive water on the surface can be removed. Pangolagrass, improved bahiagrass, and white clover grow well on this soil. Proper stocking, pasture rotation, and restricted grazing during wet periods help keep the pasture and the

Figure 9.—This well managed field of cabbage is on Immokalee sand. This soil is well suited to this use if a water control system is installed and properly managed.

soil in good condition. Fertilizer and lime are needed for optimum growth of grasses and legumes.

This soil is poorly suited to sanitary facilities, building sites, or recreational development. The main limitations are wetness, seepage, and sandy texture. Water control, including drainage outlets, is needed to overcome wetness. Fill material should be added to make this soil suitable for most urban uses. Septic tank absorption fields are mounded in most areas because of the high water table. If the density of housing is moderate or high, a community sewage system is needed to prevent contamination of water supplies by seepage. Sealing or lining of sanitary landfills with impervious soil material reduces excess seepage. Sidewalls of shallow excavations should be shored. The sandy surface layer should be stabilized for recreational use.

This soil is poorly suited to use as habitat for openland, woodland, and wetland wildlife.

Common wildlife in the county includes deer, turkeys, armadillos, skunks, sparrows, quail, woodpeckers, warblers, rattlesnakes, frogs, and bobcats. Rotational grazing, controlled burning, and maintenance of natural water levels can improve habitat for wildlife.

This Immokalee soil is in capability subclass IVw. The woodland ordination symbol for this soil is 8W. This soil is in the South Florida Flatwoods range site.

17—Brighton, Samsula, and Sanibel mucks. The soils in this map unit are nearly level and very poorly drained. These soils are in depressions and freshwater marshes and swamps. Undrained areas are ponded. The slopes are dominantly less than 1 percent.

In 95 percent of the areas of this map unit, Brighton, Samsula, and Sanibel mucks and soils that are similar make up 93 to 99 percent of the mapped areas. Dissimilar soils make up about 1 to 7 percent of the mapped areas. Generally, the mapped areas consist of about 47 percent Brighton soil and similar soils, 35 percent Samsula soil and similar soils, and 11 percent Sanibel soil. Some areas are made up of Brighton soil and similar soils, some are made up of Samsula soil and similar soils, some are made up of Sanibel soil, and some areas are made up of all of these soils. They do not occur in a regular repeating pattern. The relative proportion of combinations of the soils vary. The individual areas of the soils in this map unit are large enough to map separately; however, in considering the present and predicted use, they were mapped as one map unit.

Typically, Brighton soil has a surface layer of black muck about 8 inches thick. The underlying material extends to a depth of about 80 inches. It is very dark gray mucky peat in the upper part and dark reddish brown mucky peat in the lower part. In the mapped areas are soils that are similar to Brighton muck, but the organic material in these soils is more decomposed than in the Brighton soil.

Typically, Samsula soil has a surface layer of dark reddish brown and black muck about 26 inches thick. Below that layer, to a depth of about 30 inches, is very dark gray mucky fine sand. The underlying material to a depth of about 80 inches is grayish brown fine sand. In the mapped areas are soils that are similar to Samsula soil, but the organic matter in these soils is not as decomposed as in the Samsula soil.

Typically, Sanibel soil has a surface layer of black muck about 6 inches thick. Below that layer, to a depth of about 8 inches, is black mucky fine sand. The upper part of the underlying material, to a depth of about 28 inches, is dark grayish brown fine sand. The lower part to a depth of about 80 inches is light gray fine sand.

Undrained areas of the soils in this map unit are ponded for 6 to 9 months or more except during extended dry periods. If drained, the organic material in these soils initially shrinks and then subsides further as a result of compaction and oxidation. These losses are more rapid during the first 2 years. If the soils are drained, the organic material continues to subside at the rate of about 1 inch per year. The lower the high water table, the more rapid the loss. The permeability of Brighton, Samsula, and Sanibel soils is rapid. The available water capacity is very high in the organic materials of these soils and is moderate to low in the sandy underlying material. The natural fertility and content of organic matter in these soils are very high.

Dissimilar soils included in mapping are Basinger and Delray soils in small areas.

In most areas, the soils in this map unit have been drained and are used for growing sod and vegetable crops. In other areas, they have been left in natural vegetation. The natural vegetation consists of mixed stands of cypress, red maple, sweetgum, and blackgum. The understory includes cutgrass, maidencane, Jamaica sawgrass, sedges, ferns, and other water-tolerant grasses.

The soils in this map unit are generally not suited to most cultivated crops and citrus crops because of ponding and excessive wetness. If intensive management practices and soil-improving measures are used and a water control system is installed to remove excess water rapidly, these soils are well suited to some vegetable crops. The high water table should be maintained as near the surface as possible to help prevent subsidence of organic material. Most crops and pasture plants respond well to fertilization.

The soils in this map unit are poorly suited to use as pasture; however, they are fairly well suited to this use if a water control system is installed to remove excess surface water after heavy rains. Pangolagrass, improved bahiagrass, and white clover grow well on these soils. Maintaining the high water table close to the surface reduces excessive oxidation of the organic layers. Proper grazing practices, weed control, and fertilizer are needed to obtain high quality forage. Proper stocking, pasture rotation, and restricted grazing during wet periods help keep the pasture and the soil in good condition.

In their natural state, the soils in this map unit are not suited to use for homesites, commercial or recreational development, or sanitary facilities. The main limitations are seepage, ponding, excess humus, low strength, and subsidence.

The soils in this map unit are well suited to use as habitat for openland and wetland wildlife. They are not suited to use as habitat for woodland wildlife in most areas.

Common wildlife in the county includes the otter, wood duck, limpkin, and alligator. In addition, animals in surrounding habitats often use these areas for food and cover and as travel lanes between developed areas.

The soils in this map unit are in capability subclass VIIw, if undrained. If drained, Brighton and Sanibel soils are in capability subclass IIIw, and Samsula soil is in IVw. The woodland ordination symbol for these soils is 2W. The soils in this map unit are in the Freshwater Marshes and Ponds range site.

18—Malabar fine sand. This soil is nearly level and poorly drained. It is in sloughs and along poorly defined drainageways. The slopes are dominantly less than 2 percent.

In 80 percent of the areas of this map unit, Malabar fine sand makes up 76 to 96 percent of the mapped areas. Dissimilar soils make up about 4 to 24 percent of the mapped areas.

Typically, this soil has a surface layer of dark gray fine sand about 6 inches thick. The subsurface layer, to a depth of about 10 inches, is yellowish brown fine sand. The upper part of the subsoil, to a depth of about 35 inches, is very pale brown and yellow fine sand. The next layer, to a depth of about 48 inches, is light gray fine sand. The lower part, to a depth of about 70 inches, is gray fine sandy loam. The substratum to a depth of about 80 inches is greenish gray loamy sand that has a few pockets of sandy clay loam.

In most years, this soil has a seasonal high water table within 12 inches and the surface for 2 to 6 months. The water table can be above the surface for a short time after heavy rainfall. The permeability is rapid in the surface and subsurface layers and in the upper part of the subsoil, slow in the loamy part of the subsoil, and rapid in the substratum. The available water capacity is low to very low in the surface and subsurface layers and in the upper part of the subsoil, moderate in the lower part of subsoil, and low in the substratum. Natural fertility and the content of organic matter are low.

Dissimilar soils included in mapping are EauGallie, Basinger, and Felda soils in small areas.

In most areas, this soil has been left in natural vegetation. Some areas of this soil have been drained and are used for cultivated crops, as rangeland and pasture, or for homesites and other urban development. The natural vegetation consists mostly of slash pine, longleaf pine, live oak, water oak, and cabbage palm. The understory includes scattered saw palmetto, waxmyrtle, inkberry, pineland threeawn, panicum, maidencane, and other sedges and grasses.

Under natural conditions, this Malabar soil is poorly suited to cultivated crops and citrus crops. However, it is moderately well suited to vegetable crops if a water control system is installed to remove excess surface water rapidly and provide for subsurface irrigation. Crop residue left on or in the soil and a cropping system that includes grasses, legumes, or grass-legume mixtures help to conserve moisture, to maintain fertility, and to control erosion. Most crops and pasture plants respond well to fertilization.

This soil is well suited to pasture. If a water control system is established and maintained, excessive water can be removed. Proper stocking, pasture rotation, and restricted grazing during wet periods help keep the pasture and the soil in good condition. Pangolagrass, improved bahiagrass, and clover grow well on this soil. Fertilizer and lime are needed for optimum growth of grasses and legumes.

This soil is poorly suited to use for building sites, sanitary facilities, or recreational development. The main limitations are wetness and seepage. A water control system, including drainage outlets, is needed to overcome wetness. Fill material should be added to make this soil suitable for most urban uses. Sealing or lining of sewage lagoons and landfills with impervious soil material reduces excess seepage. Septic tank absorption fields are mounded in most areas because of the high water table. The proximity to a stream or aquifer recharge area should be considered in the placement of sanitary facilities to prevent contamination of water supplies. Cutbanks are not stable and are subject to slumping. The sandy surface layer should be stabilized for recreational use.

This soil is poorly suited to use as habitat for openland and woodland wildlife. It is moderately suited to use as habitat for wetland wildlife.

Common wildlife in the county includes deer, turkeys, armadillos, skunks, sparrows, quail, woodpeckers, warblers, rattlesnakes, frogs, and bobcats. Rotational grazing, controlled burning, and maintenance of natural water levels can improve habitat for wildlife.

This Malabar soil is in capability subclass IVw. The woodland ordination symbol for this soil is 10W. It is in the Slough range site.

19—Manatee, Floridana, and Holopaw soils, frequently flooded. The soils in this map unit are nearly level and are very poorly drained and poorly drained. These soils are on flood plains and are frequently flooded for long periods following prolonged, high intensity rains. Manatee and Floridana soils are very poorly drained, and Holopaw soil is poorly drained. Many areas are isolated by meandering stream channels. The slopes are dominantly less than 2 percent.

In 80 percent of the areas of this map unit, Manatee, Floridana, and Holopaw soils, frequently flooded, and soils that are similar make up 81 to 99 percent of the mapped areas. Dissimilar soils make up 1 to 19 percent of the mapped areas. Generally, the mapped areas consist of about 61 percent Manatee soil and similar soils, 21 percent Floridana soil and similar soils, and 10 percent Holopaw soil and similar soils. Some areas are made up of Manatee soil and similar soils, some are made up of Floridana soil and similar soils, some are made up of Holopaw soil and similar soils, and some areas are made up of all of these soils. They do not occur in a regular repeating pattern. The relative proportion of combinations of the soils vary. The individual areas of the soils in this map unit are large enough to map separately; however, in considering the present and predicted use, they were mapped as one map unit.

Typically, Manatee soil has a surface layer of black fine sand about 10 inches thick. The subsoil extends to a depth of about 52 inches. It is very dark gray sandy loam in the upper part and is dark gray fine sandy clay loam in the lower part. The substratum to a depth of about 80 inches is gray loamy fine sand. In the mapped areas are soils that are similar to Manatee fine sand, but these soils have a surface layer that is 7 to 10 inches thick, or they have a clayey subsoil.

Typically, Floridana soil has a surface layer that is about 18 inches thick. It is black mucky fine sand in the upper part and black fine sand in the lower part. The subsurface layer, to a depth of about 29 inches, is gray fine sand. The upper part of the subsoil, to a depth of about 42 inches, is gray fine sandy loam. The lower part to a depth of about 80 inches is gray sandy loam. In the mapped areas are soils that are similar to Floridana soil, but these soils have a surface layer that is 7 to 10 inches thick.

Typically, Holopaw soil has a surface layer of black fine sand about 6 inches thick. The subsurface layer, to a depth of 50 inches, is grayish brown and gray fine sand. The subsoil to a depth of about 80 inches is gray fine sandy loam. In the mapped areas are soils that are similar to Holopaw soil, but these soils have a brownish yellow subsoil underlain by loamy material.

In most years, the soils in this map unit have a seasonal high water table within 12 inches of the surface for 6 to 9 months. These soils are subject to frequent flooding during rainy periods. The duration and extent of flooding are variable and are related directly to the frequency and intensity of rainfall. The permeability of Manatee, Floridana, and Holopaw soils is rapid or moderately rapid in the surface and subsurface layers and very slow to moderate in the subsoil and substratum. The available water capacity is low to high in the surface layer of these soils and moderate to low in the subsurface layer, subsoil, and substratum. Natural fertility is medium. The content of organic matter is high in Manatee and Floridana soils and is moderate in Holopaw soil.

Dissimilar soils included in mapping are Basinger soils in small areas. Also included are dissimilar soils that are slightly better drained than the soils in this map unit, and they have a dark brown subsoil that is underlain by a loamy material at a depth of 40 inches or more.

In most areas, the soils in this map unit have been left in natural vegetation or have been cleared and are used as rangeland. The natural vegetation consists mostly of baldcypress, coastal plain willow, red maple, cabbage palm, and sweetgum. The understory includes buttonbush, maidencane, sawgrass, smartweed, sedges, and other water-tolerant grasses.

The soils in this map unit are generally not suited to most cultivated crops and citrus crops because of wetness and frequent flooding. The hazard of flooding can be reduced by constructing dikes and water retention structures, but excessive wetness remains a continuing limitation.

If a water control system is established and maintained, the soils in this map unit are moderately suited to use as pasture. Proper stocking, pasture rotation, and restricted grazing during wet periods help keep the range and the soil in good condition. Fertilizer and lime are needed for optimum growth of grasses and legumes.

The soils in this map unit are poorly suited to use for sanitary facilities, building sites, or recreational development. The main limitation is wetness. Flooding is a hazard. Wetness may be overcome by drainage, but flooding is a continuous hazard. Unless flood control structures are installed, these soils should not be considered for building sites or for sanitary facilities.

The soils in this map unit are poorly suited to use as habitat for openland and woodland wildlife. They are well suited to use as habitat for wetland wildlife.

Common wildlife in the county includes the otter, raccoon, gray squirrel, wood duck, limpkin, and alligator. In addition, animals in surrounding habitats often use these areas for food and cover and as travel lanes between developed areas.

Manatee and Floridana soils are in capability subclass Vw. The woodland ordination symbol for these soils is 6W. Holopaw soil is in capability subclass VIw. The woodland ordination symbol for this soil is 10W. The soils in this map unit are in the Freshwater Marshes and Ponds range site.

20—Myakka and EauGallie fine sands. The soils in this map unit are nearly level and poorly drained. These soils are on broad plains on the flatwoods. The slopes are dominantly less than 2 percent.

In 95 percent of the areas of this map unit, Myakka and EauGallie fine sands and soils that are similar make up 78 to 99 percent of the mapped areas. Dissimilar soils make up 1 to 22 percent of the mapped areas. Generally, the mapped areas consist of about 58 percent Myakka soil and similar soils and 32 percent EauGallie soil and similar soils. Some areas are made up of Myakka soil and similar soils, some are made up of EauGallie soil and similar soils, and some areas are made up of both of these soils. They do not occur in a regular repeating pattern. The relative proportion of combinations of the soils vary. The individual areas of the soils in this map unit are large enough to map separately; however, in considering the present and predicted use, they were mapped as one map unit.

Typically, Myakka soil has a surface layer of black fine sand about 5 inches thick. The subsurface layer, to a depth of about 28 inches, is light gray fine sand. The upper part of the subsoil, to a depth of about 30 inches, is black fine sand. The lower part, to a depth of about 45 inches, is dark brown fine sand. The substratum to a depth of about 80 inches is brown fine sand. In the mapped areas are soils that are similar to Myakka fine sand, but these soils have a subsoil within 20 inches of the surface or between depths of 30 and 50 inches.

Typically, EauGallie soil has a surface layer of dark gray fine sand about 5 inches thick. The subsurface layer, to a depth of about 18 inches, is light gray fine sand. The upper part of the subsoil, to a depth of about 37 inches, is black and dark brown fine sand. The next layer, to a depth of about 41 inches, is light brownish gray fine sand. The lower part, to a depth of about 60 inches, is very pale brown sandy clay loam. The substratum to a depth of about 80 inches is light brownish gray loamy sand that has pockets of fine sand and sandy loam. In the mapped areas are soils that are similar to EauGallie fine sand, but these soils have a loamy subsoil within 40 inches of the surface.

During most years, the soils in this map unit have a seasonal high water table within 12 inches of the surface for 1 month to 4 months. The permeability of Myakka soil is rapid in the surface and subsurface layers and substratum and moderate or moderately rapid in the subsoil. The permeability of EauGallie soil is rapid in the surface and subsurface layers, moderate or moderately rapid in the sandy part of the subsoil, and moderately slow in the loamy part of the subsoil. The available water capacity is very low in the surface and subsurface layers and substratum and moderate to high in the subsoil of Myakka and EauGallie soils. Natural fertility is low in the soils in this map unit, and the content of organic matter is moderate to moderately low.

Dissimilar soils included in mapping are Basinger and Pompano soils in small areas.

In most areas, the soils in this map unit have been left in natural vegetation. In a few areas, these soils are used for cultivated crops and citrus crops, as improved pasture, or for homesites and other urban development. The natural vegetation consists mostly of longleaf and slash pines and live and laurel oaks. The understory includes lopsided indiangrass, inkberry, saw palmetto, pineland threeawn, waxmyrtle, bluestem, panicum, and other grasses.

The soils in this map unit are generally not suited to most cultivated crops because of wetness; however, if a water control system is installed and soil-improving measures are used, these soils are moderately well suited to most cultivated crops. Proper row management, lateral ditches or tiles, and well constructed outlets help to remove the excess surface water. Crop residue left on or near the surface helps to conserve moisture, to maintain tilth, and to control erosion. These soils are moderately well suited to citrus crops in areas that are relatively free of freezing temperatures. Wetness is the main limitation. A properly managed water control system is needed to maintain the water table at an effective depth. Proper arrangement and bedding of tree rows, lateral ditches or tiles, and well constructed outlets help to remove excess surface water and to lower the high water table. Frequent applications of fertilizer and lime are generally needed.

The soils in this map unit are well suited to use as pasture. If a water control system is properly established and maintained, excessive water can be removed. Pangolagrass, improved bahiagrass, and white clover grow well on this soil. Proper stocking, pasture rotation, and restricted grazing during wet periods help keep the pasture and the soil in good condition. Fertilizer and lime are needed for optimum growth of grasses and legumes.

The soils in this map unit are poorly suited to use for sanitary facilities, building sites, and recreational development. The main limitations are seepage and wetness. Water control, including drainage outlets, are needed to overcome wetness. Fill material should be added to make these soils suitable for most urban uses. Septic tank absorption fields do not function properly during rainy periods because of wetness and the moderate or moderately slow permeability of the soils. Septic tank absorption fields are mounded in most areas because of the high water table. If the density of housing is moderate or high, a community sewage system is needed to prevent contamination of water supplies by seepage. Sealing or lining of sanitary landfills with impervious soil material reduces excess seepage. Sidewalls of shallow excavations should be shored. The sandy surface layer should be stabilized for recreational uses.

The soils in this map unit are poorly suited to use as habitat for openland, woodland, and wetland wildlife.

Common wildlife in the county includes deer, turkeys, armadillos, skunks, sparrows, quail, woodpeckers, warblers, rattlesnakes, frogs, and bobcats. Rotational grazing, controlled burning, and maintenance of natural water levels can improve habitat for wildlife.

The soils in this map unit are in capability subclass IVw. The woodland ordination symbol for Myakka soil is

8w, and it is 10W for EauGallie soil. These soils are in the South Florida Flatwoods range site.

21—Nittaw mucky fine sand, depressional. This soil is nearly level and very poorly drained. It is in depressions, freshwater marshes, and swamps. Undrained areas are ponded. The slopes are dominantly less than 2 percent.

In 80 percent of the areas of this map unit, Nittaw mucky fine sand, depressional, and soils that are similar makes up 83 to 99 percent of the mapped areas. Dissimilar soils make up 1 to 17 percent of the mapped areas.

Typically, this soil has a surface layer that is about 10 inches thick. It is black mucky fine sand in the upper part and black fine sand in the lower part. The subsoil extends to a depth of about 50 inches. It is very dark gray sandy clay in the upper part and is dark gray sandy clay in the lower part. The substratum to a depth of about 80 inches is light gray fine sand. In the mapped areas are soils that are similar to Nittaw mucky fine sand, but these soils have an organic surface layer that is 7 to 10 inches thick.

In most years, undrained areas of this soil are ponded for 6 to 9 months or more except during extended dry periods. The permeability is rapid in the surface layer and substratum and is slow in the subsoil. The available water capacity is moderate to high. This soil has a high shrink-swell potential, but it seldom dries enough to shrink and crack. The content of organic matter in this soil is moderate, and natural fertility is moderate.

Dissimilar soils included in mapping are soils in small areas that do not have a loamy subsoil.

In most areas, this soil has been left in natural vegetation. In some areas, it has been drained and is used as pasture and rangeland. The natural vegetation consists of pondcypress, red maple, sweetbay, and blackgum. The understory includes waxmyrtle, greenbrier, wild grape, and other water-tolerant forbs and grasses.

This Nittaw soil is generally not suited to most cultivated crops and citrus crops because of ponding and wetness. An adequate drainage system is needed in most areas to remove excess surface water and to reduce soil wetness, but suitable outlets generally are not available. If suitable outlets are available, this soil is well suited to a number of vegetable crops and for growing watercress. Seedbed preparation that includes bedding of the rows help to lower the high water table. Frequent applications of fertilizer and lime are generally needed.

If a water control system is established and maintained, this soil is well suited to use as pasture. A water control system is needed to remove excess surface water. Proper stocking, pasture rotation, and restricted grazing during wet periods help keep the pasture and the soil in good condition. Fertilizer and lime are needed for optimum growth of grasses and legumes.

This soil is poorly suited to use for sanitary facilities, building sites, and recreational development. The main limitations are wetness, ponding, and shrink-swell potential. Large amounts of fill material should be added, and water control, including surface and subsurface drainage, is needed to make areas of this soil suitable for most urban uses. The effects of the shrinking and swelling of this soil is a continuous hazard. Soils that are better suited to these uses generally are in nearby, higher areas.

This soil is not suited to use as habitat for openland wildlife. It is poorly suited to use as habitat for woodland wildlife and is well suited to use as habitat for wetland wildlife.

Common wildlife in the county includes the otter, raccoon, gray squirrel, wood duck, limpkin, and alligator. In addition, animals in surrounding habitats often use these areas for food and cover and as travel lanes between developed areas.

This Nittaw soil is in capability subclass VIIw. The woodland ordination symbol for this soil is 2W. It is in the Freshwater Marshes and Ponds range site.

22—Nittaw muck, occasionally flooded. This soil is nearly level and very poorly drained. It is on the flood plains and is occasionally flooded for long periods following prolonged, high intensity rains. The slopes are dominantly less than 2 percent.

This map unit consists of about 60 percent Nittaw soil and about 40 percent soils that are similar to the Nittaw soil.

Typically, this soil has a surface layer of black muck about 2 inches thick. It is underlain by black mucky fine sand to a depth of about 10 inches. The upper part of the subsoil, to a depth of about 20 inches, is very dark brown sandy clay. The lower part, to a depth of about 60 inches, is dark gray sandy clay. The substratum to a depth of about 80 inches is gray sandy loam. In the mapped areas are soils that are similar to Nittaw soil, but these soils have a loamy subsoil.

During most years, this soil has a seasonal high water table within 12 inches of the surface for 2 to 6 months or more. This soil is subject to occasional flooding during periods of heavy rainfall. Flooding is directly related to the frequency and intensity of rainfall. The permeability is rapid in the surface layer and substratum and slow in the subsoil. The available water capacity is moderate to high. This soil has a high shrink-swell potential, but it seldom dries enough to shrink and crack. The content of organic matter is high, and natural fertility is moderate.

In most areas, this soil has been left in natural vegetation or cleared and used as rangeland. The natural vegetation consists mostly of baldcypress, red maple, sweetgum, hickory, and cabbage palm. The understory includes waxmyrtle, greenbrier, wildgrape, cabbage palm, and other water-tolerant forbs and grasses.

This Nittaw soil is generally not suited to most cultivated crops and citrus crops because of wetness and flooding. An adequate drainage system is needed in most areas to remove excess surface water and to reduce soil wetness, but suitable outlets generally are not available. If suitable outlets are available and if flooding can be controlled, this soil is well suited to a number of vegetable crops and also to growing watercress. Seedbed preparation that includes bedding of rows helps lower the high water table. Frequent applications of fertilizer and lime are generally needed.

If a water control system is established and maintained, this soil is well suited to use as pasture. A water control system is needed to remove excess surface water. Proper stocking, pasture rotation, and restricted grazing during wet periods help keep the pasture and the soil in good condition. Fertilizer and lime are needed for optimum growth of grasses and legumes.

This soil is poorly suited to use for sanitary facilities, building sites, and recreational development. The main limitations are wetness, seepage, and shrink-swell potential. Flooding is a hazard. While wetness may be overcome by drainage, flooding is a continuous hazard. Unless flood control structures are installed, this soil should not be considered for building sites, sanitary facilities, or recreational development.

This soil is poorly suited to use as habitat for openland and woodland wildlife. It is well suited to use as habitat for wetland wildlife.

Common wildlife in the county includes the otter, raccoon, gray squirrel, wood duck, limpkin, and alligator. In addition, animals in surrounding habitats often use these areas for food and cover and as travel lanes between developed areas.

This Nittaw soil is in capability subclass Vw. The woodland ordination symbol for this soil 6W. This soil is in the Freshwater Marshes and Ponds range site.

23—Nittaw, Okeelanta, and Basinger soils, frequently flooded. The soils in this map unit are nearly level and poorly drained and very poorly drained. These soils are on the flood plains and are frequently flooded following prolonged high intensity rains. Nittaw and Okeelanta soils are very poorly drained, and Basinger soils are poorly drained and very poorly drained. The slopes are dominantly less than 2 percent.

In 95 percent of the areas of this map unit, Nittaw, Okeelanta, and Basinger soils, frequently flooded, and soils that are similar make up 94 to 99 percent of the mapped areas. Dissimilar soils make up about 1 to 6 percent of the mapped areas. Generally, the mapped areas consist of about 45 percent Nittaw soil and similar soils, 34 percent Okeelanta soil and similar soils, and 19 percent Basinger soil. Some areas are made up of Nittaw soil and similar soils, some are made up of Okeelanta soil and similar soils, some are made up of Basinger soil, and some areas are made up of all of these soils. They do not occur in a regular repeating pattern. The relative proportion of combinations of the soils vary. The individual areas of the soils in this map unit are large enough to map separately; however, in considering the present and predicted use, they were mapped as one map unit.

Typically, Nittaw soil has a surface layer of black muck about 4 inches thick. This layer, to a depth of 9 inches, is underlain by black mucky fine sand. The subsoil to a depth of about 80 inches is very dark gray, dark gray, and gray clay. In the mapped areas are soils that are similar to Nittaw muck, but these soils have a loamy subsoil.

Typically, Okeelanta soil has a surface layer of black muck about 42 inches thick. The underlying material to a depth of about 80 inches is black and light gray fine sand. In the mapped areas are soils that are similar to Okeelanta muck, but the underlying material in these soils is loamy or they have a surface layer of muck that is more than 51 inches thick.

Typically, Basinger soil has a surface layer of very dark gray sand about 4 inches thick. The subsurface layer, to a depth of about 22 inches, is light brownish gray fine sand that has mottles. The subsoil, to a depth of about 38 inches, is light brownish gray and very dark brown fine sand. The substratum to a depth of about 80 inches is gray fine sand.

The soils in this map unit have a seasonal high water table within 12 inches of the surface. In most years, these soils are subject to frequent flooding during periods of heavy rains. The duration and extent of flooding are variable and are directly related to the frequency and intensity of rainfall. The permeability of Nittaw soil is rapid in the surface layer and slow in the subsoil. The permeability of Okeelanta and Basinger soils is rapid. The available water capacity is moderate to high in Nittaw soil. The available water capacity is very low to moderate in Basinger soil. It is very low to moderate in the sandy part of Okeelanta soil and very high in the organic part. Nittaw soil has a high shrink-swell potential, and Okeelanta and Basinger soils have a low shrink-well potential. Okeelanta soil has high subsidence potential. If the soils in this map unit are drained, the organic material initially shrinks on drying and then subsides further as a result of compaction and oxidation. These losses are more rapid during the first 2 years. If the soil is drained, the organic material continues to subside at the rate of about 1 inch per year. The lower the water table, the more rapid the loss. The content of organic matter and natural fertility is high in Nittaw and Okeelanta soils and low in Basinger soil.

Dissimilar soils included in mapping are soils in small areas that are in slightly higher positions on the flood plain than Nittaw, Okeelanta, and Basinger soils.

In most areas, the soils in this map unit have been left in natural vegetation. In some areas, these soils have been cleared and are used as pasture or rangeland (fig. 10). The natural vegetation consists mostly of baldcypress, red maple, sweetgum, cabbage palm, water oak, and hickory. The understory includes waxmyrtle, Carolina willow, primrose willow, cattail, and other water-tolerant grasses.

The soils in this map unit are generally not suited to most cultivated crops and citrus crops because of flooding and wetness. An adequate drainage system is needed in most areas to remove excess surface water and to reduce soil wetness, but suitable drainage outlets generally are not available. If suitable outlets are available and if flooding can be controlled, these soils are well suited to a number of vegetable crops. Seedbed preparation that includes bedding of the rows helps lower the high water table. Frequent applications of fertilizer and lime are generally needed.

If a water control system is established and maintained, the soils in this map unit are well suited to use as pasture. A water control system is needed to remove excess surface water. Proper stocking, pasture rotation, and restricted grazing during wet periods help keep the pasture and the soil in good condition. Fertilizer and lime are needed for optimum growth of grasses and legumes.

The soils in this map unit are generally not suited to use for sanitary facilities, building sites, or recreational development. The main limitations are wetness, excess humus, and shrink-swell potential. Flooding is a hazard. Large amounts of fill material should be added and extensive drainage outlets and major flood control structures are needed to make areas of this soil suitable for most urban uses. The effects of the shrinking and swelling of Nittaw soil is a continuous hazard. Soils that are better suited to these uses generally are in nearby, higher areas.

These soils are poorly suited to use as habitat for openland and woodland wildlife. They are well suited to use as habitat for wetland wildlife.

Common wildlife in the county includes the otter, raccoon, gray squirrel, wood duck, limpkin, and alligator. In addition, animals in surrounding habitats often use these areas for food and cover and as travel lanes between developed areas.

Figure 10.—In this area, Nittaw, Okeelanta, and Basinger soils, frequently flooded, are in the Freshwater Marshes and Ponds range site.

Nittaw soil is in capability subclass Vw, Okeelanta soil is in VIIw, and Basinger soil is in VIw. The woodland ordination symbol for these soils is 6W. The soils in this map unit are in the Freshwater Marshes and Ponds range site.

24—Paola-St. Lucie sands, 0 to 5 percent slopes. The soils in this map unit are nearly level to gently sloping and excessively drained. These soils are on upland ridges. The slopes are 0 to 5 percent.

In 95 percent of the areas of this map unit, Paola-St. Lucie sands, 0 to 5 percent slopes, and soils that are similar make up 81 to 99 percent of the mapped areas. Dissimilar soils make up 1 to 19 percent of the mapped areas. Generally, the mapped areas consist of about 52 percent Paola soil and similar soils and 43 percent St. Lucie soils. The individual areas of the soils in this map unit are so intricately mixed that mapping them separately at the selected scale is not practical. The proportions and soil patterns are relatively consistent in most delineations of the map unit.

Typically, Paola soil has a surface layer of dark gray sand about 3 inches thick. The subsurface layer, to a depth of about 25 inches, is light gray sand. The subsoil, to a depth of about 47 inches, is yellowish brown sand. The subsoil has a few tongues filled with material from the subsurface layer and few to common weakly cemented very dark gray concretions. The substratum to a depth of about 80 inches is light yellowish brown sand. In the mapped areas are soils that are similar to Paola soil, but these soils have a brown subsoil at a depth of 50 inches or more.

Typically, St. Lucie soil has a surface layer of dark gray sand about 2 inches thick. The underlying material to a depth of about 80 inches is light gray and white sand.

The soils in this map unit have a seasonal high water table at a depth of 80 inches or more. The permeability of these soils is very rapid. The available water capacity is very low. Natural fertility and the content of organic matter are very low.

Dissimilar soils included in mapping are soils in small areas that have a seasonal high water table within 60 to 80 inches of the surface. The underlying material in these dissimilar soils is mottled.

In most areas, the soils in this map unit are used for homesites and other urban development. In a few areas, these soils are used for citrus crops or recreational use or are left in natural vegetation. The natural vegetation consists mostly of sand pine, Chapman oak, and myrtle oak. The understory includes saw palmetto, pricklypear cactus, goldleaf aster, deermoss, bluestem, and pineland threeawn.

The soils in this map unit are generally not suited to most cultivated crops and citrus crops because of the droughtiness and very low natural fertility. If irrigation is provided, these soils are well suited to citrus crops in areas that are relatively free of freezing temperatures. A specially designed and properly managed sprinkler irrigation system helps to maintain optimum soil moisture and ensure maximum yields. A cover crop between rows helps to conserve moisture, controls erosion, and improves the content of organic matter. Frequent applications of fertilizer and lime are generally needed to maintain yields.

The soils in this map unit are poorly suited to use as pasture. The very low available water capacity limits the production of plants during extended dry periods. Deep-rooted plants, such as Coastal bermudagrass and bahiagrass, are more drought tolerant if properly fertilized and limed. Proper stocking, pasture rotation, and timely deferment of grazing help keep the pasture in good condition.

The soils in this map unit are well suited to homesites and other urban development. The main limitation is the instability of cutbanks. Sidewalls of shallow excavations should be shored. Population growth has resulted in increased construction of houses. If the density of housing is moderate or high, a community sewage system may be needed to prevent contamination of water supplies by seepage. The proximity to a stream or canal should be considered in the placement of a septic tank absorption field to prevent lateral seepage and ground water contamination.

These soils are poorly suited to use for recreational development and sanitary landfills. The sandy surface layer should be stabilized for recreational uses. Droughtiness is a problem during extended dry periods. Plants that tolerate droughtiness should be selected if irrigation is not provided. Sealing or lining of sanitary landfills or sewage lagoons with impervious soil material is necessary to reduce excessive seepage.

The soils in this map unit are poorly suited to use as habitat for openland and woodland wildlife. They are not suited to use as habitat for wetland wildlife.

Common wildlife in the county includes the deer, towhee, flycatcher, scrub jay, black racer, gopher tortoise, scrub lizard, and sand skink. The threatened Florida scrub jay is dependent for its survival on this fast disappearing habitat.

Paola soil is in capability subclass VIs. The woodland ordination symbol for this soil is 2S. St. Lucie soil is in capability subclass VIIs. The woodland ordination symbol for this soil is 3S. The soils in this map unit are in the Sand Pine Scrub range site.

25—Pineda fine sand. This soil is nearly level and poorly drained. It is on low hammocks, in broad, poorly defined drainageways, and in sloughs. The slopes are dominantly less than 2 percent.

In 95 percent of the areas of this map unit, Pineda fine sand and soils that are similar make up 79 to 99 percent of the mapped areas. Dissimilar soils make up 1 to 21 percent of the mapped areas.

Typically, this soil has a surface layer of black fine sand about 2 inches thick. The subsurface layer, to a depth of about 18 inches, is light gray fine sand. The upper part of the subsoil, to a depth of about 26 inches, is pale brown fine sand. The lower part, to a depth of about 68 inches, is dark gray sandy loam. This part of the subsoil has about 20 percent tongues of light gray fine sand. The substratum to a depth of about 80 inches is greenish gray loamy sand mixed with shell fragments. In the mapped areas are soils that are similar to Pineda fine sand; but in these similar soils, the upper part of the subsoil is at a depth of more than 40 inches, or the subsoil is gray and grayish brown sandy material underlain by a loamy layer.

In most years, this soil has a seasonal high water table within 12 inches of the surface for 2 to 6 months. The high water table may be above the surface for a short period after heavy rainfall. The permeability is rapid in the surface and subsurface layers and in the upper part of the subsoil. It is slow or very slow in the lower part of the subsoil. The available water capacity is very low to low in the surface and subsurface layers and in the upper part of the subsoil. It is moderate in the lower part of the subsoil and in the substratum. Natural fertility and the content of organic matter are low.

Dissimilar soils included in this map unit are EauGallie soils in small areas. Also included are some soils that do not have a loamy subsoil.

In most areas, this soil has been left in natural vegetation. In a few areas, it is used as pasture, rangeland, or for homesites and other urban development. The natural vegetation consists mostly of cabbage palm, scattered longleaf pine, and slash pine. The understory includes waxmyrtle, blue maidencane, chalky bluestem, bluejoint panicum, scattered saw palmetto, pineland threeawn, and various weeds and grasses.

Under natural conditions, this Pineda soil is poorly suited to cultivated crops. However, if a water control system is installed to remove excess water rapidly and provide for subsurface irrigation, this soil is fairly well suited to many vegetable crops. Soil-improving crops should be included in the rotation system and crop residue should be left on or in the soil to help control erosion and maintain the content of organic matter. Seedbed preparation should include bedding of rows. Fertilizer and lime should be applied according to the needs of the crop. This soil is well suited to citrus crops in areas that are relatively free of freezing temperatures and if a water control system is installed to maintain the water table at an effective depth. Planting trees on beds lowers the depth of the high water table. A close-growing cover crop between rows is needed to protect the soil from blowing. Regular applications of fertilizers are needed.

This soil is well suited to use as pasture. Pangolagrass, improved bahiagrass, and white clover grow well on this soil if properly managed. A water control system is needed to remove excess surface water after heavy rains. Management practices should include regular applications of fertilizer and lime and controlled grazing.

This soil is poorly suited to use for building sites, sanitary facilities, or recreational development. Water control, including surface and subsurface drainage, is needed to overcome excessive wetness. Sealing or lining of sewage lagoons and trench sanitary landfills with impervious soil material reduces excessive seepage. Mounding may be needed for septic tank absorption fields because of the high water table. If the density of housing is moderate to high, a community sewage system may be needed to prevent contamination of water supplies. The sandy surface layer should be stabilized for recreational uses. Sidewalls of shallow excavations should be shored.

This soil is moderately suited to use as habitat for openland and wetland wildlife. It is poorly suited to use as habitat for woodland wildlife.

Common wildlife in the county includes deer, turkeys, armadillos, skunks, sparrows, quail, woodpeckers, warblers, rattlesnakes, frogs, and bobcats. Rotational grazing, controlled burning, and maintenance of natural water regimes can improve wildlife habitat.

This Pineda soil is in capability subclass IIIw. The woodland ordination symbol for this soil is 10W. This soil is in the Slough range site.

26—Udorthents, excavated. This map unit consists of excavated areas of unconsolidated or heterogeneous soil and geologic materials, which have been removed mainly for use in road construction or as fill material in low areas and for building foundations. Areas of this map unit consist of a pit or depressed area, which is surrounded by sidewalls of variable steepness.

Included in mapping are small areas of spoil or stockpiles of variable soil and geologic material around the edges of the pits. Most areas of Udorthents, excavated, locally called borrow pits, are from 5 to 40 feet deep. Some of the pit bottoms are seasonally ponded. Other areas are filled with water year round and are shown as water on the detailed soil maps at the back of this publication.

Most pit areas have been left idle. These areas must be smoothed, shaped, and filled if they are to be used for agriculture or for urban development. The potential of these soils for use as habitat for wildlife is high if the areas are reshaped and revegetated to conform with existing landscapes. Areas that are filled with water have a high potential for fish if they are stocked and managed properly. Onsite investigation is necessary to determine the potential for any use.

This map unit has not been assigned to a capability subclass or range site or has not been assigned a woodland ordination symbol.

27—Pomello fine sand, 0 to 5 percent slopes. This soil is nearly level to gently sloping and moderately well drained. It is on low ridges and knolls on the flatwoods. The slopes range from 0 to 5 percent.

In 80 percent of the areas of this map unit, Pomello fine sand, 0 to 5 percent slopes, and soils that are similar make up 78 to 98 percent of the mapped areas. Dissimilar soils make up 2 to 22 percent of the mapped areas.

Typically, this soil has a surface layer of light gray fine sand about 2 inches thick. The subsurface layer, to a depth of about 31 inches, is white fine sand. The subsoil, to a depth of about 50 inches, is black, dark brown, and brown fine sand. The substratum to a depth of 80 inches is pale brown fine sand. In the mapped areas are soils that are similar to Pomello fine sand, but the upper part of the subsoil is within 30 inches of the surface, is at a depth of more than 50 inches, or the similar soils do not have a subsoil.

In most years, this soil has a seasonal high water table at a depth of 36 to 60 inches for 1 month to 4 months. The permeability is very rapid in the surface and subsurface layers, moderately rapid in the subsoil, and rapid in the substratum. The available water capacity is very low in the surface and subsurface layers and in the substratum, and it is high in the subsoil. Natural fertility and the content of organic matter are very low.

Dissimilar soils included in mapping are Millhopper and EauGallie soils in small areas. Also included are some soils that have a loamy subsoil at a depth of more than 40 inches.

In most areas, this soil is used as rangeland or it has been left in natural vegetation. In a few areas, it is used for citrus crops, cultivated crops, as pasture, or for homesites and other urban development. The natural vegetation consists mostly of longleaf pine, sand pine, and slash pine. The understory includes creeping bluestem, lopsided indiangrass, running oak, saw palmetto, and pineland threeawn.

This Pomello soil is poorly suited to citrus crops. Only fair yields can be obtained if the level of management is high. A water control system is necessary to maintain the water table at an effective depth during wet periods and to provide water for irrigation during periods of low rainfall. Regular applications of fertilizer and lime are needed to obtain maximum yields. A suitable cover crop should be maintained between tree rows to prevent the soil from blowing. This soil is poorly suited to cultivated crops, but if intensive management practices are used, a few special crops can be grown. The adapted crops are limited unless intensive management practices are followed. For maximum yields, irrigation should be provided and fertilizer and lime should be applied according to the needs of the crop. Soil-improving crops and crop residue should be used to control erosion and maintain the content of organic matter in the soil.

This soil is moderately well suited to use as pasture. Deep-rooted plants, such as Coastal bermudagrass and bahiagrass, are better suited to this soil than other grasses. Droughtiness is the major limitation except during wet periods. Regular applications of lime and fertilizer are needed. Overgrazing should be prevented.

This soil is poorly suited to use for sanitary facilities, building sites, or recreational development. It has moderate limitations for dwellings without basements and small commercial buildings. Water control, including surface and subsurface drainage, is needed to overcome excessive wetness. Septic tank absorption fields may need to be enlarged because of wetness. The rapid permeability of this soil can cause contamination of ground water in areas of septic tank absorption fields. If the density of housing is moderate to high, a community sewage system may be needed to prevent contamination of water supplies by seepage. Sealing or lining sewage lagoons and trench sanitary landfills with impervious soil material reduces excessive seepage. For recreational development, the sandy surface layer should be stabilized. Water control is needed, and sidewalls of shallow excavations should be shored.

This soil is poorly suited to use as habitat for openland and woodland wildlife. It is not suited to use as habitat for wetland wildlife.

Common wildlife in the county includes the deer, towhee, flycatcher, scrub jay, black racer, gopher tortoise, scrub lizard, and sand skink.

This Pomello soil is in capability subclass VIs. The woodland ordination symbol for this soil is 8S. This soil is in the South Florida Flatwoods range site.

28—Pompano fine sand, occasionally flooded. This soil is nearly level and poorly drained. It is on the flood plains and is occasionally flooded following prolonged high intensity rains. The slopes are dominantly less than 2 percent.

In 90 percent of the areas of this map unit, Pompano fine sand, occasionally flooded, and soils that are similar make up 82 to 99 percent of the mapped areas. Dissimilar soils make up about 1 to 18 percent of the mapped areas.

Typically, this soil has a surface layer of gray sand about 4 inches thick. The underlying material to a depth of about 80 inches is pale brown and light gray fine sand. In the mapped areas are soils that are similar to Pompano fine sand, but these soils have a subsurface layer that has a brownish color, and they are slightly better drained than Pompano soil.

In most years, this soil has a seasonal high water table within 12 inches of the surface for 2 to 6 months. This soil is subject to occasionally periods of flooding, which normally occurs during rainy periods. The duration and extent of flooding are variable and are directly related to the frequency and intensity of rainfall.

Dissimilar soils included in this map unit are Nittaw soils in small areas. The permeability of this soil is rapid. The available water capacity is very low. Natural fertility and the content of organic matter are low.

In most areas, this soil has been left in natural vegetation. In a few areas, it is used for cultivated crops and citrus crops, as pasture and rangeland, or for homesites and other urban development. The natural vegetation consists mostly of cypress, longleaf pine, slash pine, cabbage palm, and laurel oak. The understory includes waxmyrtle, inkberry, scattered saw palmetto, blue maidencane, pineland threeawn, sand cordgrass, low panicum, and various weeds and grasses.

Under natural conditions, this Pompano soil is poorly suited to cultivated crops and citrus crops because of wetness, droughtiness, and flooding. The number of adapted crops that can be grown is limited if very intensive management practices, including flood control, are not followed. If good management practices are used, this soil has fair suitability for cropland. A water control system to remove excess water rapidly and provide for subsurface irrigation is necessary. Soil-improving cover crops should be included in the cropping system and crop residue should be left on or in the soil to control erosion and maintain the content of organic matter. Seedbed preparation should include bedding of rows. Fertilizer and lime should be applied according to the needs of the crop.

This soil is moderately well suited to use as pasture and rangeland. Pangolagrass, improved bahiagrass, and white clover grow well on this soil if properly managed. Management practices should include a water control system to remove excess surface water after heavy rains, regular applications of fertilizer and lime, and controlled grazing during periods of flooding.

This soil is poorly suited to use for sanitary facilities, building sites, and recreational development. Water control, including surface and subsurface drainage, is needed to overcome excessive wetness; however, flooding is a continuous hazard. Septic tank absorption fields may need to be enlarged because of wetness. The rapid permeability of this soil may cause pollution of ground water in areas with septic tank absorption fields. If the density housing is moderate to high, a community sewage system may be needed to prevent contamination of water supplies by seepage. Drainage systems and flood control structures may be needed to control excessive wetness and flooding. Sealing or lining of sewage lagoons and trench sanitary landfills with impervious soil material reduces excessive seepage. The sidewalls of shallow excavations should be shored. The sandy surface layer should be stabilized for recreational uses.

This soil is not suited to use as habitat for openland wildlife. It is poorly suited to use as habitat for woodland wildlife and is moderately suited to use as habitat for wetland wildlife.

Common wildlife in the county includes the otter, raccoon, gray squirrel, wood duck, limpkin, and alligator. In addition, animals in surrounding habitats often use these areas for food and cover and as travel lanes between developed areas.

This Pompano soil is in capability subclass VIw. The woodland ordination symbol for this soil is 6W. This soil is in the Slough range site.

29—St. Johns and EauGallie fine sands. The soils in this map unit are nearly level and poorly drained. These soils are on low broad plains on the flatwoods. The slopes are dominantly less than 2 percent.

In 95 percent of the areas of this map unit, St. Johns and EauGallie fine sand and soils that are similar make up 81 to 99 percent of the mapped areas. Dissimilar soils make up 1 to 19 percent of the mapped areas. Generally, the mapped areas consist of about 57 percent St. Johns soil and similar soils and 36 percent EauGallie soil and similar soils. Some areas are made up of St. Johns soil and similar soils, some are made up of EauGallie soil and similar soils, and some areas are made up of both of these soils. These soils do not occur in a regular repeating pattern. The relative proportion of combinations of the soils vary. The individual areas of the soils in this map unit are large enough to map separately; however, in considering the present and predicted use, they were mapped as one map unit.

Typically, St. Johns soil has a surface layer of black fine sand about 12 inches thick. The subsurface layer, to a depth of about 22 inches, is gray fine sand. The subsoil, to a depth of about 54 inches, is black and very dark gray fine sand. The substratum to a depth of about 80 inches is grayish brown fine sand. In the mapped areas are soils that are similar to St. Johns fine sand, but these soils have a surface layer that is 7 to 10 inches thick, have a subsoil at a depth of more than 30 inches, or have a yellow or brownish yellow subsoil.

Typically, EauGallie soil has a surface layer of black fine sand about 3 inches thick. The subsurface layer, to a depth of about 17 inches, is light gray fine sand. The subsoil extends to a depth of about 73 inches. It is very dark gray and pale brown fine sand in the upper part and is grayish brown sandy loam in the lower part. The substratum to a depth of about 80 inches is gray loamy sand. In the mapped areas are soils that are similar to EauGallie fine sand, but these soils have a subsoil that is at a depth of more than 30 inches, or the loamy part of the subsoil is within 40 inches of the surface.

During most years, the soils in this map unit have a seasonal high water table within 12 inches of the surface for 1 month to 4 months. The permeability of St. Johns soil is rapid in the surface and subsurface layers and in the substratum and is moderate or moderately slow in the subsoil. The permeability of EauGallie soil is rapid in the surface and subsurface layers. It is moderate or moderately slow in the sandy part of the subsoil and slow or very slow in the loamy part of the subsoil. The available water capacity is very low to low in the surface and subsurface layers and in the substratum of St. Johns and EauGallie soils and is moderate to high in the subsoil. Natural fertility is low and the content of organic matter is moderate.

Dissimilar soils included in mapping are Felda soils in small areas.

In most areas, the soils in this map unit have been left in natural vegetation. In a few areas, these soils are used for cultivated crops and citrus crops, as pasture and rangeland, or for homesites and other urban development. The natural vegetation consists mostly of longleaf pine and slash pine. The understory includes lopsided indiangrass, inkberry, saw palmetto, pineland threeawn, waxmyrtle, bluestem, panicum, and other grasses.

The soils in this map unit are moderately well suited to citrus crops in areas that are relatively free of freezing temperatures. A properly managed water control system is needed to maintain the water table at an effective depth. Proper arrangement and bedding of rows, lateral ditches or tiles, and well constructed outlets help to remove excess surface water and to lower the high water table. Frequent applications of fertilizer and lime are generally needed to maintain yields. These soils are generally not suited to most cultivated crops because of wetness. However, if a water control system is installed and soil-improving measures are used, these soils are moderately well suited to most cultivated crops. Proper row management, lateral ditches or tiles, and well constructed drainage outlets help to remove the excess surface water. Crop residue left on or near the surface helps to conserve moisture, to maintain tilth, and to control erosion. Most crops and pasture plants respond well to fertilization.

The soils in this map unit are well suited to use as pasture. A water control system is needed to remove excess surface water. Pangolagrass, improved bahiagrass, and white clover grow well on these soils. Proper stocking, pasture rotation, and restricted grazing during wet periods help keep the pasture and the soil in good condition. Fertilizer and lime are needed for optimum growth of grasses and legumes.

The soils in this map unit are poorly suited to use for sanitary facilities, building sites, and recreational development. The main limitations are seepage and wetness. Population growth has resulted in increased construction of houses. Water control, including surface and subsurface drainage, is needed to overcome wetness. Fill material should be added to make these soils suitable for most urban uses. Septic tank absorption fields do not function properly during rainy periods because of wetness and the moderate to very slow permeability of the soils. Septic tank absorption fields are mounded in most areas because of the high water table. If the density of housing is moderate or high, a community sewage system may be needed to prevent contamination of water supplies by seepage. Sealing or lining sanitary landfills with impervious soil material reduces excess seepage. Sidewalls of shallow excavations should be shored. The sandy surface layer should be stabilized for recreational use.

The soils in this map unit are moderately suited to use as habitat for openland, woodland, and wetland wildlife.

Common wildlife in the county includes deer, turkeys, armadillos, skunks, sparrows, quail, woodpeckers, warblers, rattlesnakes, frogs, and bobcats. Rotational grazing, controlled burning, and maintenance of natural water levels can improve wildlife habitat.

St. Johns soil is in capability subclass IIIw and EauGallie soil is in capability subclass IVw. The woodland ordination symbol for these soils is 10W. The soils in this map unit are in the South Florida Flatwoods range site.

30—Seffner fine sand. This soil is nearly level and somewhat poorly drained. It is on broad, low ridges and knolls on the flatwoods. The slopes are dominantly less than 2 percent.

In 95 percent of the areas of this map unit, Seffner fine sand and soils that are similar make up 82 to 99 percent of the mapped areas. Dissimilar soils make up 1 to 18 percent of the mapped areas.

Typically, this soil has a surface layer of very dark gray fine sand about 15 inches thick. The underlying material to a depth of about 80 inches is very pale brown, light gray, and white fine sand. In the mapped areas are soils that are similar to Seffner fine sand, but these soils have a surface layer that is 7 to 10 inches thick.

In most years, this soil has a seasonal high water at a depth of 12 to 36 inches for 2 to 4 months. It recedes to a depth of less than 60 inches during extended dry periods. The permeability is rapid. The available water capacity is moderate in the surface and low to very low in the underlying material. Natural fertility is moderate. The content of organic matter is moderate to moderately low.

Included in mapping are some dissimilar soils in small areas that have a dark brown subsoil at a depth of more than 50 inches.

In most areas, this soil is used for citrus crops, as pasture and rangeland, or for homesites and urban development. In a few areas, it is used for cultivated crops. Some areas have been left in natural vegetation, which consists mostly of longleaf pine, slash pine, live oak, and laurel oak. The understory includes waxmyrtle, fetterbush lyonia, creeping bluestem, broomsedge bluestem, grassleaf goldaster, lopsided indiangrass, saw palmetto, panicum, and pineland threeawn.

Under natural conditions, this Seffner soil is poorly suited to most cultivated crops. The number of adapted crops is limited unless intensive management practices are used. A water control system is needed to remove excess water in wet periods and to provide for subsurface irrigation in dry periods. Soil-improving crops should be included in the cropping system and crop residue should be left on or in the soil to control erosion and maintain the content of organic matter. Applications of fertilizer and lime should be applied according to the needs of the crop. The suitability of this soil for citrus crops is fair in areas that are relatively free of freezing temperatures and if good management practices are used. A close-growing cover crop between the trees is needed to prevent the soil from blowing. A water control system is necessary to maintain the high water table at an effective depth during the wet periods. A specially designed and properly managed irrigation system helps to maintain optimum soil moisture and insure maximum yields. Regular applications of fertilizer and lime are needed.

This soil is moderately well suited to use as pasture. Pangolagrass and improved bahiagrass grow well on this soil if properly managed. Regular applications of lime and fertilizer are needed. Overgrazing should be prevented.

This soil is poorly suited to use for sanitary facilities, shallow excavations, or recreational development. It is moderately suited to dwellings without basements and small commercial buildings. Water control, including surface and subsurface drainage, is needed to overcome excessive wetness. Septic tank absorption fields may need to be enlarged because of wetness. The rapid permeability of this soil may cause pollution of ground water in areas of septic tank absorption fields. If the density of housing is moderate to high, a community sewage system may be needed to prevent contamination of water supplies by seepage. The proximity to a stream or aquifer recharge area should be considered in the placement of sanitary facilities to prevent contamination of ground water.

Sidewalls of shallow excavations should be shored. Sealing or lining sewage lagoons or trench sanitary landfills with impervious soil material reduces excessive seepage.

The sandy surface layer should be stabilized for recreational use. Droughtiness is a problem during extended dry periods. Regular applications of fertilizer are needed to maintain lawns and landscape vegetation.

This soil is moderately suited to use as habitat for openland wildlife. It is well suited to use as habitat for woodland wildlife and is not suited to use as habitat for wetland wildlife.

Common wildlife in the county includes the deer, towhee, flycatcher, scrub jay, black racer, gopher tortoise, scrub lizard, and sand skink. The threatened Florida scrub jay is dependent for its survival on this fast disappearing habitat.

This Seffner soil is in capability subclass IIIw. The woodland ordination symbol for this soil is 10W. This soil is in the South Florida Flatwoods range site.

31—Tavares-Millhopper fine sands, 0 to 5 percent slopes. The soils in this map unit are nearly level to gently sloping and moderately well drained. These soils are on low ridges and knolls on the uplands. The slopes are nearly smooth to slightly convex.

In 80 percent of the areas of this map unit, Tavares-Millhopper fine sands, 0 to 5 percent slopes and soils that are similar make up 77 to 94 percent of the mapped areas. Dissimilar soils make up 6 to 23 percent of the mapped areas. Generally, the mapped areas consist of about 45 percent Tavares soil and similar soils, and about 41 percent Millhopper soil and similar soils. The individual areas of this map unit are so intricately mixed that mapping them separately at the selected scale is not practical. The proportions and soil patterns are relatively consistent in most delineations of the map unit.

Typically, Tavares soil has a surface layer of very dark grayish brown fine sand about 6 inches thick. The underlying material to a depth of about 80 inches is yellowish brown, light yellowish brown, very pale brown, and white fine sand. In the mapped areas are soils that are similar to Tavares fine sand, but these soils are in slightly lower positions on the landscape, and they are somewhat poorly drained.

Typically, Millhopper soil has a surface layer of gray fine sand about 7 inches thick. The subsurface layer, to a depth of about 45 inches, is very pale brown and pale brown fine sand. The upper part of the subsoil, to a depth of about 54 inches, is very pale brown sandy loam. The lower part to a depth of about 80 inches is light gray sandy clay loam. In the mapped areas are soils that are similar to Millhopper fine sand, but in these soils the upper part of the subsoil is within 40 inches of the surface.

The soils in this map unit have a seasonal high water table at a depth of 36 to 60 inches for 2 to 6 months. The permeability of Tavares soil is rapid or very rapid. The permeability of Millhopper soil is rapid in the surface and subsurface layers and moderately slow in the subsoil. The available water capacity is very low in Tavares soils. The available water capacity of Millhopper soil is low in the surface and subsurface layers and moderate in the subsoil. Natural fertility is very low in Tavares soil and low in Millhopper soil. The content of organic matter is very low in Tavares soil and low to moderately low in Millhopper soil.

Dissimilar soils included in mapping are Astatula, Felda, and Pomello soils in small areas. Also included are dissimilar soils that have a brown subsoil at a depth of more than 50 inches.

In most areas, the soils in this map unit are used for citrus crops, as pasture and rangeland, or for homesites and other urban development. In a few areas, these soils are used for cultivated crops. Some areas have been left in natural vegetation, which consists mostly of laurel oak, turkey oak, live oak, slash pine, and longleaf pine. The understory includes creeping bluestem, lopsided indiangrass, panicum, and pineland threeawn.

The soils in this map unit are well suited to citrus crops in areas that are relatively free of freezing temperatures and if good management practices, which include irrigation and regular appications of fertilizer and lime, are used. A close-growing cover crop between the trees is needed to prevent the soil from blowing. Under natural conditions, these soils are poorly suited to most cultivated crops. Droughtiness and rapid leaching of plant nutrients are the main limitations. Management practices should include irrigation and regular applications of fertilizer and lime. Soil-improving crops should be included in the cropping system and crop residue should be left on or in the soil to control erosion and to maintain the content of organic matter.

Under natural conditions, the soils in this map unit are poorly suited to use as pasture. Droughtiness and low natural fertility are the main limitations. Intensive management practices are needed to overcome these limitations. Deep-rooted plants, such as Coastal bermudagrass and improved bahiagrass, are more drought tolerant. Regular applications of fertilizer and lime are needed. Overgrazing should be prevented.

The soils in this map unit are well suited to use for homesites, other urban use, or recreational development. The proximity to a stream or canal should be considered in the placement of a septic tank absorption field to prevent lateral seepage and ground water contamination. If the density of housing is moderate to high, a community sewage system may be needed to prevent contamination of water supplies by seepage. These soils are poorly suited to sewage lagoons, trench sanitary landfills, and shallow excavations. Sealing or lining of sewage lagoons and trench sanitary landfills with impervious soil material reduces excessive seepage. Water control is needed for trench sanitary landfills. Sidewalls of shallow excavations should be shored. The sandy surface layer should be stabilized for recreational uses.

The soils in this map unit are moderately suited to use as habitat for openland and woodland wildlife. They are are not suited to use as habitat for wetland wildlife.

Common wildlife in the county includes the fox squirrel, deer, quail, ground dove, towhee, gopher tortoise, pocket gopher, and fence lizard. So much of this community has been converted to citrus groves or urban development that this habitat for wildlife and several wildlife species dependent upon it are considered endangered.

The soils in this map unit are in capability subclass IIIs. The woodland ordination symbol for these soils is 10S. They are in the Longleaf Pine-Turkey Oak Hills range site.

32—Tavares-Millhopper fine sands, 5 to 8 percent slopes. The soils in this map unit are nearly level to sloping and are moderately well drained. These soils are on hillsides on the uplands. The slopes are smooth to convex.

In 95 percent of this map unit, Tavares-Millhopper fine sands, 5 to 8 percent slopes and soils that are similar make up 93 to 99 percent of the mapped areas. Dissimilar soils make up 1 to 7 percent of the mapped areas. Generally, the mapped areas consist of about 58 percent Tavares soil and about 40 percent Millhopper soil and soils that are similar. The individual areas of the soils in this map unit are so intricately mixed that mapping them separately at the selected scale is not practical. The proportions and soil patterns are relatively consistent in most delineations of the map unit.

Typically, Tavares soil has a surface layer of dark gray fine sand about 9 inches thick. The underlying material extends to a depth of about 80 inches. It is gray fine sand in the upper part, light gray fine sand in the middle part, and very pale brown fine sand in the lower part.

Typically, Millhopper soil has a surface layer of dark gray fine sand about 7 inches thick. The subsurface layer extends to a depth of about 50 inches. It is very pale brown fine sand in the upper part and is white fine sand in the lower part. The subsoil extends to a depth of about 80 inches or more. It is pale brown sandy loam in the upper part and gray sandy loam in the lower part. In the mapped areas are soils that are similar to Millhopper fine sand, but in these soils the upper part of the subsoil is within 40 inches of the surface.

The soils in this map unit have a seasonal high water table at a depth of 36 to 60 inches for up to 6 months. The permeability of Tavares soil is rapid or very rapid. The permeability of Millhopper soil is rapid in the surface and subsurface layers and moderately slow in the subsoil. The available water capacity is very low in Tavares soil, and it is low in the surface and subsurface layers and moderate in the subsoil in Millhopper soil. Natural fertility is very low in Tavares soil and is low in Millhopper soil. The content of organic matter is very low in Tavares soil and low to moderately low in Millhopper soil.

Dissimilar soils included in mapping are Astatula soils in small areas. These soils are in higher positions on the landscape and are excessively drained.

In most areas, the soils in this map unit are used for citrus crops, improved pasture, or homesites and other urban development. In a few areas, these soils are used for cultivated crops. The natural vegetation consists of laurel oak, turkey oak, live oak, slash pine, and longleaf pine. The understory includes creeping bluestem, lopsided indiangrass, panicum, and pineland threeawn.

The soils in this map unit are well suited to citrus crops in areas that are relatively free of freezing temperatures and if good management practices, which include irrigation and regular applications of fertilizer and lime, are used. A close-growing cover crop between the trees is needed to prevent the soil from blowing. Under natural conditions, the soils in this map unit are poorly suited to most cultivated crops. Droughtiness and rapid leaching of plant nutrients are the main limitations. Management practices should include irrigation and regular applications of fertilizer and lime. Soil-improving crops should be included in the cropping system and crop residue should be left on or in the soil to help control erosion and maintain the content of organic matter.

Under natural conditions, the soils in this map unit are poorly suited to pasture. Droughtiness and low natural fertility are the main limitations. Intensive management practices are needed to overcome these limitations. Deep-rooted plants, such as Coastal bermudagrass and improved bahiagrass, are more drought tolerant. Regular applications of fertilizer and lime are needed. Overgrazing should be prevented.

The soils in this map unit are well suited to use for homesites and other urban development. Land shaping may be needed in the more sloping areas. The proximity to a stream or canal should be considered in the placement of a septic tank absorption field to prevent lateral seepage and ground water pollution. If the density of housing is moderate to high, a community sewage system may be needed to prevent contamination of water supplies by seepage.

These soils are poorly suited to sewage lagoons, trench sanitary landfills, shallow excavations, and recreational uses. Sealing or lining sewage lagoons and trench sanitary landfills with impervious soil material reduces excessive seepage. Water control is needed for trench sanitary landfills. Sidewalls of shallow excavations should be shored. The sandy surface layer should be stabilized for recreational use.

The soils in this map unit are moderately suited to use as habitat for openland and woodland wildlife. They are not suited to use as habitat for wetland wildlife.

Common wildlife in the county includes the fox squirrel, deer, quail, ground dove, towhee, gopher tortoises, pocket gophers, and fence lizard. So much of this community has been converted to citrus groves or urban development that this habitat for wildlife and several species dependent upon it are considered endangered.

The soils in this map unit are in capability subclass IVs. The woodland ordination symbol for these soils is 10S. They are in the Longleaf Pine-Turkey Oak Hills range site.

33—Terra Ceia muck, frequently flooded. This soil is nearly level and very poorly drained. It is on the flood plains and is frequently flooded for long periods following prolonged, high intensity rains. The slopes are less than 2 percent.

This map unit consists of about 73 percent Terra Ceia muck, frequently flooded, and 27 percent of soils that are similar to Terra Ceia soil.

Typically, this soil is very dark gray muck to a depth of 80 inches or more. In the mapped areas are soils that are similar to Terra Ceia muck, but these soils have an organic layer that contains fibers from woody plants at a depth of 30 to 50 inches.

Under natural conditions, this soil has a high water table at or above the surface for most of the year except during extended dry periods. This soil is subject to frequent flooding during rainy periods. Flooding is directly related to the frequency and intensity of rainfall. If drained, the organic material in Terra Ceia soil initially shrinks on drying and then subsides further as a result of compaction and oxidation. These losses are more rapid during the first 2 years. If the soil is intensively farmed, the organic material continues to subside at the rate of about 1 inch per year. The lower the water table, the more rapid the loss. The permeability is rapid, but internal drainage is impeded by the shallow water table. The available water capacity is very high. Natural fertility is high. The content of organic matter is very high.

In most areas, this soil has been left in natural vegetation. In a few areas, it is used as improved pasture. The natural vegetation consists of Carolina willow, primrose willow, waxmyrtle, pickerelweed, sawgrass, cattail, buttonbush, arrowhead, ferns and maidencane and other water-tolerant grasses.

Under natural conditions, this soil is not suited to cultivated crops. However, if intensive management practices and soil-improving measures are used and a water control system is installed to remove excess water rapidly and protect these areas from flooding, this soil has good suitability for many vegetable crops. A properly designed water control system should be installed and maintained to remove the excess water when crops are on the land and to keep the soil saturated at all other times. Good management practices include seedbed preparation and crop rotation. Soil-improving crops should be included in the cropping system and crop residue should be left on or in the soil to help control erosion and maintain the content of organic matter. Under natural conditions, this soil is not suited to citrus crops. It is poorly suited to this use even if intensive management practices, such as bedding of rows, are used and the water control system is adequate.

Under natural conditions, this soil is not suited to use as pasture; however, if an adequate water control system is installed to remove excess surface water after heavy rains, suitability is good. The water control system should maintain the high water table near the surface to prevent excess subsidence of the organic material. Grazing should be controlled to maintain plant vigor.

This soil is not suited to use for building site, sanitary facilities, or recreational development because of flooding, wetness, excess humus, and subsidence. Flooding is a continuous hazard. Unless major flood control structures are installed, this soil should not be considered for building sites, sanitary facilities, or recreational development.

This soil is poorly suited to use as habitat for openland and woodland wildlife. It is well suited to use as habitat for wetland wildlife.

Common wildlife in the county includes the otter, raccoon, gray squirrel, wood duck, limpkin, and alligator. In addition, animals in surrounding habitats often use this area for food and cover and as travel lanes between developed areas.

This Terra Ceia soil is in capability subclass 7w. This soil has not been assigned a woodland ordination symbol. This soil is in the Freshwater Marshes and Ponds range site.

34—Urban land, 0 to 12 percent slopes. This miscellaneous area is covered by urban facilities, such as shopping centers, parking lots, industrial buildings, houses, streets, sidewalks, airports, and related structures. The natural soil can not be observed. The slopes are dominantly less than 2 percent but range to 12 percent.

In areas mapped as Urban land, 85 percent or more of the soil surface is covered by asphalt, concrete, buildings, or other impervious surfaces that obscure or alter the soils so that their identification is not feasible.

Included in mapping are moderately urbanized areas that have structures covering 50 to 85 percent of the soil surface. Soils in the unoccupied areas of this map unit that are used as lawns, vacant lots, playgrounds, and parks, mostly consist of Astatula, Apopka, Millhopper, Myakka, Pomello, St. Lucie, Paola, Smyrna, Tavares, and EauGallie soils. Generally, these soils have been altered by grading and shaping, or fill material has been used to cover these soils to a depth of about 12 inches. The fill material consists of sandy and loamy materials. In places, this material contains fragments of limestone and shell. The individual areas of soils in this map unit are so small that mapping them separately at the selected scale is not practical.

Drainage systems have been established in most areas of Urban land. Depth to the seasonal high water table is dependent upon the functioning of the drainage system.

Urban land has not been assigned to a capability subclass or range site or has not been assigned a woodland ordination symbol.

35—Wabasso fine sand. This soil is nearly level and poorly drained. It is on broad plains on the flatwoods. The slopes are dominantly less than 2 percent.

In 95 percent of the areas of this map unit, Wabasso fine sand and soils that are similar make up 82 to 99 percent of the mapped areas. Dissimilar soils make up 1 to 18 percent of the mapped areas.

Typically, this soil has a surface layer of very dark gray fine sand about 6 inches thick. The subsurface layer, to a depth of about 18 inches, is grayish brown fine sand. The upper part of the subsoil, to a depth of about 25 inches, is dark reddish brown fine sand. The next layer, to a depth of about 27 inches, is light brownish gray fine sand. The lower part, to a depth of about 70 inches, is gray sandy clay loam. The substratum to a depth of about 80 inches or more is light gray loamy sand. In the mapped areas are soils that are similar to Wabasso fine sand, but in these soils, the loamy part of the subsoil is at a depth of more than 40 inches.

In most years, this soil has a seasonal high water table within 12 inches and the surface for 2 to 6 months. The permeability is rapid in the surface and subsurface layers, moderate in the sandy part of the subsoil and slow or very slow in the loamy part, and rapid in the substratum. The available water capacity is very low in the surface and subsurface layers, moderate in the subsoil, and low in the substratum. Natural fertility is low and the content of organic matter is moderate to moderately low.

Dissimilar soils included in this map unit are Pineda soils in small areas.

In most areas, this soil has been left in natural vegetation. In a few areas, it is used for cultivated crops and citrus crops, as pasture and rangeland, or for homesites or other urban development. The natural vegetation consists mostly of longleaf pine, slash pine, live oak, and water oak. The understory includes lopsided indiangrass, inkberry, saw palmetto, pineland threeawn, waxmyrtle, bluestem, panicum, and other grasses.

This soil is poorly suited to cultivated crops because of wetness and the sandy texture in the root zone; however, if a water control system is installed and maintained and soil-improving measures are used, this soil has fair suitability for many vegetable crops. A water control system is needed to remove excess water in wet periods and to provide for subsurface irrigation in dry periods. Soil-improving crops included in the rotation system and crop residue left on or in the soil help control erosion and help maintain the content of organic matter in this soil. Seedbed preparation should include bedding of rows.

The suitability of this soil for citrus crops is good in areas that are relatively free of freezing temperatures and if a water control system is installed to maintain the high water table at an effective depth. Planting trees on beds helps lower the depth of the water table. A close-growing cover crop is needed between tree rows to protect the soil from blowing. Regular applications of lime and fertilizer are needed.

This soil is well suited to use as pasture. Pangolagrass, improved bahiagrass, and white clover grow well on this soil if properly managed. A water control system is needed to remove excess surface water after heavy rains. Proper stocking, pasture rotation, and restricted grazing during wet periods help keep the pasture and the soil in good condition. Regular applications of fertilizer and lime are needed.

This soil is poorly suited to use for homesites, other urban development, recreational development, or sanitary facilities. Water control is needed to overcome excessive wetness. Septic tank absorption fields may need to be enlarged because of the slow permeability of this soil. Sealing or lining of trench sanitary landfills or sewage lagoons with impervious soil material reduces excessive seepage. Sidewalls of shallow excavations should be shored. The sandy surface layer should be stabilized for recreational use.

This soil is poorly suited to use as habitat for openland and wetland wildlife. It is moderately suited to use as habitat for woodland wildlife.

Common wildlife in the county includes deer, turkeys, armadillos, skunks, sparrows, quail, woodpeckers, warblers, rattlesnakes, frogs, and bobcats. Rotational grazing, controlled burning, and maintenance of natural water levels can improve habitat for wildlife.

This Wabasso soil is in capability subclass IIIw. The woodland ordination symbol for this soil is 10W. This soil is in the South Florida Flatwoods range site.

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavior characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis for predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as rangeland and woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern that is in harmony with nature.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs. It can also be a very useful guide when selecting sites for houses, buildings, and pond reservoirs.

Crops and Pasture

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

The soils in Seminole County do not meet the requirements for prime farmland.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under "Detailed Soil Map Units." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

Seminole County is experiencing rapid urbanization. Acreage in crops, pasture, and woodland has gradually been decreasing as more and more land is used for urban development. However, large areas of productive land remain in agricultural use. It is expected that the urbanization pressures will continue for some time, and the amount of land devoted to agriculture will continue to decline. Natural disasters, such as the severe Christmas freeze in 1983, will also contribute to the decline of land use for agriculture.

Some of the agricultural lands in Seminole County are classified as unique and special. The soils on agricultural land that have severe limitations for urban use, such as Samsula, Okeelanta, and Terra Ceia soils, will be protected by the nature of their limitations. It is the citrus-growing areas, pasture, and rangeland that will come under the most severe urbanization pressure. The use of this soil survey to help make land use decisions that will influence the future role of farming in the county is discussed in the section "Town and Country Planning."

All forms of water and wind erosion occur in Seminole County to some extent. Soils on which erosion is a problem are scattered throughout the county. A recent increase in the practice of planting grasses between citrus rows has helped to decrease both wind and water erosion in the citrus groves. Vegetables are grown predominantly on the nearly level areas that are not subject to intensive water erosion, but the fields are left without vegetation cover at certain times of the year and this contributes to wind erosion. The most serious erosion problems in Seminole County is on unprotected soils on construction sites. When preparing building sites, the soil is generally stripped of all vegetation and is subjected to the unrelenting forces of wind and water for 3 or more months.

Loss of the soil by erosion reduces crop production and increases pollution. Productivity is reduced as the surface is lost, and organic matter is reduced as part of the subsoil is incorporated into the plow layer. If erosion is controlled, the pollution of streams by sediment can be reduced and the quality of water for municipal use, for recreation, and for fish and wildlife can be improved.

Water erosion is not a major problem in Seminole County. The soils are sandy and are mostly nearly level. Erosion from rapid runoff takes place only during heavy rains on unprotected soils that have short, steep slopes. Examples are Astatula and Paola soils that are excessively drained and Tavares soils that are moderately well drained and have slopes of more than 2 percent.

Conservation practices, such as maintaining a vegetation cover on the surface layer, reducing runoff, and increasing infiltration, will help control erosion. A management system that maintains a grassed vegetation cover between the citrus rows can hold soil erosion losses to amounts that do not reduce the productive capacity of the soils. On livestock farms, legume and grass forage crops should be included in the cropping system to reduce erosion on sloping land, provide nitrogen, and improve tilth for the next crop.

Conservation tillage leaves crop residue on the surface, increases infiltration, and reduces runoff and subsequent erosion. This practice can be adapted to most soils in the county.

Wind erosion is a major hazard on the sandy and organic soils. Wind can damage soils and tender crops in a few hours in open, unprotected areas if it is strong and the soil is dry and bare of vegetation or surface mulch. Keeping a vegetation cover and surface mulch on this soil reduces wind erosion.

Wind erosion is damaging for several reasons. It reduces soil fertility by removing the finer soil particles and the organic matter; damages or destroys crops by sandblasting; spreads diseases, insects, and weed seeds; and creates health hazards and cleaning problems. Control of wind erosion reduces duststorm damage and improves the quality of the air for healthier living conditions.

Field windbreaks of adapted trees and shrubs, such as cherry laurel, slash pine, southern redcedar, and Japanese privet and strips of small grained crops, are effective in reducing wind erosion and crop damage. Field windbreaks and strip crops are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field. The intervals depend on the erodibility of the soil and the susceptibility of the crop to damage from sandblasting.

Information about conservation practices to control erosion on each kind of soil in the county is available in the local offices of the Soil Conservation Service.

Soil drainage is a major concern in management on most of the acreage used for crops and pasture in Seminole County. Some soils, such as Felda soils that are poorly drained and Basinger, Floridana, Hontoon, Nittaw, and Samsula soils that are very poorly drained, are naturally wet and restrict production of crops common to the area.

During rainy periods in most years, excessive wetness causes damage in the root zone in some of the somewhat poorly drained soils unless the soils are artificially drained. Examples are Seffner and Adamsville soils. Also, excessive wetness causes some damage to pasture plants during rainy periods in most of the poorly drained soils if these soils are not artificially drained. Examples are mainly Immokalee, Malabar, St. Johns, Myakka, and Wabasso soils. These poorly drained soils also have a low available water capacity and are droughty during dry periods. It is generally necessary to irrigate these soils to ensure quality pasture plants and to obtain maximum yields.

The very poorly drained soils, such as Canova, Brighton, Okeelanta, and Terra Ceia soils, are very wet during rainy periods. Water stands on the surface in most areas, and the production of specialty crops or good quality pasture plants is not possible unless the soils are artificially drained.

The kind of surface drainage system and subsurface irrigation system needed varies with the kind of soil and the pasture plants to be grown on the soil. A combination of surface drains and subsurface irrigation systems is needed for intensive pasture production. Information on the drainage and irrigation systems needed for each soil in the county is available in the local offices of the Soil Conservation Service.

Soil fertility is naturally low in most of the sandy soils in the county. Most of the soils are strongly acid if they have not been limed. Soils, such as Nittaw and Floridana soils, have a thick surface layer that has a high content of organic matter, have a higher soil reaction, and are higher in natural fertility than most soils in the county. Available phosphorus and potash levels are naturally low in most soils in Seminole County. On all soils, kinds and amounts of lime and fertilizer added to the soils should be based on the result of soil tests, on the needs of the crop, and on the expected yields. The Cooperative Extension Service can help in determining the proper application of fertilizer and lime needed.

Soil tilth is an important factor in the germination of seeds, root development, and infiltration of water into the soil. Soils that have good tilth are porous and have a granular structure.

Most soils in Seminole County have a sandy surface layer that has good tilth. Generally the structure of the surface layer of most soils in the county is weak. The content of organic matter is low to moderate in most areas. In dry soils that are low in organic matter content, a slight crust can form on the surface layer after heavy rain. Returning crop residue to the soil and regular additions of organic matter from other sources will improve soil tilth, increase soil fertility, and reduce crust formation.

Citrus

Citrus crops are grown in a few parts of the county, which mostly are in high recharge areas for the Floridan aquifer. In 1960, approximately 21,000 acres of citrus was grown in Seminole County. The overall citrus acreage declined to 1,500 acres in 1986 *(6)* as a result of the severe damage many groves sustained in the December freeze of 1983 and the January freeze of 1985, as well as from the pressure of urbanization.

Citrus is grown on a wide variety of soils in Seminole County. The soils on which citrus is grown range from the excessively drained Astatula and Paola soils to the poorly drained Immokalee and Wabasso soils. Supplemental irrigation improves production on the droughty soils. Water must be controlled on most poorly drained soils.

Some soils that are used for citrus crops are in low areas that have poor air drainage and frequent frost pockets. These areas are generally poorly suited to citrus crops. Grasses or legumes planted between the citrus rows help minimize the damage caused by wind erosion in young groves and in groves that have been severely pruned back because of freeze damage.

Most soils on which citrus is grown are low in natural fertility and must be supplemented with fertilizer and lime to ensure optimum yields.

Vegetables

Vegetables are grown extensively on the soils on the south shore of Lake Monroe. With an adequate water control system, Wabasso, Malabar, and St. Johns soils are well suited to high-value vegetable crops. Some vegetables are also grown on the organic soils on the south shore of Lake Jessup. When these soils are drained, the organic material oxidizes and subsides at a rate of about 1 inch per year. Keeping the soil saturated during periods when crops are not being grown reduces the rate of subsidence.

These organic soils are highly susceptible to wind erosion. Crop residue is generally left on the surface when no crops or water are on the soils to minimize the soil blowing hazard.

Most soils used to produce vegetables are irrigated. Irrigation systems include subirrigation, drip, and sprinkler. If an adequate water control system is maintained, most of the soils on the flatwoods can be used for vegetable crops. The poorly drained Immokalee, Myakka, St. Johns, and Wabasso soils are sandy soils that have good internal drainage and are suited to sweet corn, cabbage, and cucumbers. Smaller acreages of many other truck crops are grown on a wide variety of soils. Many vegetables including beans, cabbage, cauliflower, cucumbers, onions, peppers, and squash, are grown on Immokalee and Myakka soils and on other soils on the flatwoods.

Pastureland

Pastures in the county are used to produce forage for beef and dairy cattle. The sale of beef cattle in cow-calf operations is the major livestock enterprise. Bahiagrass and Coastal bermudagrass are the main pasture plants grown in the county. Excess grass is harvested as hay for winter feed or is sold at the farm. Pastures in many parts of the county are depleted because of overgrazing and undermanagement. Pasture yields are closely related to the kind of soil. Proper pasture management depends on soil properties, kinds of pasture plants, lime and fertilizer inputs, available moisture, and animal density. Yields can be increased by applying lime and fertilizer as needed and using grass-legume mixtures.

If artificially drained, the poorly drained soils on the flatwoods are well suited to improved pasture grasses. During wet periods, excessive wetness of some of the poorly drained soils causes damage to pasture grasses unless the soils are artificially drained.

Yields Per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 4. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that insures the smallest possible loss.

For yields of irrigated crops, it is assumed that the irrigation system is adapted to the soils and to the crops grown, that good quality irrigation water is uniformly applied as needed, and that tillage is kept to a minimum.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 4 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for use as cropland. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major, and generally expensive, landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for woodland, and for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit. Only class and subclass are used in this survey. These levels are defined in the following paragraphs.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The capability classes that are in this survey are defined as follows:

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode, but they have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *w* or *s,* to the class numeral, for example, IIIw. The letter *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); and *s* shows that the soil is limited mainly because it is shallow, droughty, or stony.

The soils in class V are subject to little or no erosion, but they have other limitations that restrict their use to pasture, rangeland, woodland, wildlife habitat, or recreation. Class V contains only the subclasses indicated by *w* or *s*.

Woodland Management and Productivity

This section contains information about the relationship between soils and trees. It informs landowners and operators of the capability of soils to produce trees and suggests suitable conservation practices to achieve maximum potential of the soil for woodland use.

About 64,000 acres of commercial woodlands is in Seminole County *(17)*.

A well managed stand of trees prevents soil deterioration and helps to conserve soil and water resources. One of the natural functions of trees is to protect the soil. Trees slow the fall of raindrops and allow the soil to absorb the moisture. Erosion is not a problem on most forest land in the county, but the ability of tree cover to allow more moisture to enter the soil is important to maintaining ground water supplies. Properly managed forests are an important part of the direct and indirect economy. Practices to be considered in achieving proper management are discussed briefly in the following paragraphs.

Trees and ground cover are destroyed by uncontrolled wildfires; or if the trees are not killed, their growth is slowed, or they may be scarred, which allows the entry of insects and diseases. This is particularly true in stands predominantly of hardwoods. Fire lessens the ability of the soil to absorb water, and it consumes litter that contributes organic matter to the soil.

Countywide fire protection is furnished by the Florida Division of Forestry. Individual landowners should observe all the rules of fire protection. Firebreaks should be constructed and maintained around and through all woodlands. These firebreaks can slow or stop a fire under normal conditions. Prescribed burning should be practiced with the advice and assistance of the Florida Division of Forestry or qualified consultant foresters.

Most of the woodland of the county is understocked and in need of stand improvement. Many areas of woodland are also used for livestock production (fig. 11). Tree farming is a good land use in many areas. Idle land can be profitably used to grow desirable trees. Pine can grow on a variety of soils, and they require a minimum of care once established.

To profit most from tree farming, a forest owner should use proper cutting practices. Proper practices vary with the condition of the woodland.

Detailed information and assistance in woodland management can be obtained through the local offices of the Soil Conservation Service or the Florida Division of Forestry.

Soils vary in their ability to produce trees. Depth, fertility, texture, and the available water capacity influence tree growth. Elevation, aspect, and climate determine the kinds of trees that can grow on a site. Available water capacity and depth of the root zone are major influences of tree growth.

Figure 11.—This area of grazed woodland is in the Adamsville-Sparr fine sands map unit.

This soil survey can be used by woodland managers planning ways to increase the productivity of forest land. Some soils respond better to fertilization than others, and some are more susceptible to landslides and erosion after roads are built and timber is harvested. Some soils require special efforts to reforest. The common forest understory plants are also listed. Table 5 summarizes this forestry information and rates the soils for a number of factors to be considered in management. *Slight, moderate*, and *severe* are used to indicate the degree of the major soil limitations to be considered in forest management.

The first tree listed for each soil under the column "Common trees" is the indicator species for that soil. An indicator species is a tree that is common in the area and that is generally the most productive on a given soil.

Table 5 lists the *ordination symbol* for each soil. The first part of the ordination symbol, a number, indicates the potential productivity of a soil for the indicator species in cubic meters per hectare. The larger the number, the greater the potential productivity. Potential productivity is based on the site index and the point where mean annual increment is the greatest.

The second part of the ordination symbol, a letter, indicates the major kind of soil limitation for use and management. The letter *W* indicates a soil in which excessive water, either seasonal or year-round, causes a significant limitation. The letter *S* indicates a dry, sandy soil.

Ratings of the *erosion hazard* indicate the probability that damage may occur if site preparation activities or harvesting operations expose the soil. The risk is *slight* if no particular preventive measures are needed under ordinary conditions.

Ratings of *equipment limitation* indicate limits on the use of forest management equipment, year-round or seasonal, because of such soil characteristics as slope, wetness, stoniness, or susceptibility of the surface layer to compaction. As slope gradient and length increase, it becomes more difficult to use wheeled equipment. On the steeper slopes, tracked equipment must be used. The rating is *moderate* if slopes are steep enough that wheeled equipment cannot be operated safely across the slope, if soil wetness restricts equipment use from 2 to 6 months per year, or if special equipment is needed to avoid or reduce soil compaction. The rating is *severe* if soil wetness restricts equipment use for more than 6 months per year, or if special equipment is needed to avoid or reduce soil compaction. Ratings of *moderate* or *severe* indicate a need to choose the most suitable equipment and to carefully plan the timing of harvesting and other management operations.

Ratings of *seedling mortality* refer to the probability of death of naturally occurring or properly planted seedlings of good stock in periods of normal rainfall as influenced by kinds of soil or topographic features. *Seedling mortality* is caused primarily by too much water or too little water. The factors used in rating a soil for seedling mortality are texture of the surface layer, depth and duration of the water table, rock fragments in the surface layer, rooting depth, and the aspect of the slope. Mortality generally is greatest on soils that have a sandy or clayey surface layer. The risk is *moderate* if expected mortality is between 25 and 50 percent and *severe* if expected mortality exceeds 50 percent. Ratings of *moderate* or *severe* indicate that it may be necessary to use containerized or larger than usual planting stock or to make special site preparations, such as bedding, furrowing, installing surface drainage, or providing artificial shade for seedlings. Reinforcement planting is often needed if the risk is *moderate* or *severe*.

Ratings of *windthrow hazard* consider the likelihood of trees being uprooted by the wind. Restricted rooting depth is the main reason for windthrow. Rooting depth can be restricted by a high water table, fragipan, or bedrock, or by a combination of such factors as soil wetness, texture, structure, and depth. The risk is *slight* if strong winds cause trees to break but do not uproot them; *moderate* if strong winds cause an occasional tree to be blown over and many trees to break; and *severe* if moderate or strong winds commonly blow trees over. Ratings of *moderate* or *severe* indicate the need for care in thinning or possibly not thinning. Specialized equipment may be needed to avoid damage to shallow root systems in partial cutting operations. A plan for periodic salvage of windthrown trees and the maintenance of a road and trail system may be needed.

Ratings of *plant competition* indicate the likelihood of the growth or invasion of undesirable plants. *Plant competition* becomes more severe on the more productive soils, on poorly drained soils, and on soils having a restricted root zone that holds moisture. The risk is *slight* if competition from undesirable plants reduces adequate natural or artificial reforestation but does not necessitate intensive site preparation and maintenance. The risk is *moderate* if competition from undesirable plants reduces natural or artificial reforestation to the extent that intensive site preparation and maintenance are needed. The risk is *severe* if competition from undesirable plants prevents adequate natural or artificial reforestation unless the site is intensively prepared and maintained. A *moderate* or *severe* rating indicates the need for site preparation to ensure the development of an adequately stocked stand. Managers must plan site preparation measures to ensure reforestation without delays.

The potential productivity of *common trees* on a soil is expressed as a *site index*. Common trees are listed in the order of their observed general occurrence. Generally, only two or three tree species dominate.

The *site index* is determined by taking height measurements and determining the age of selected trees within stands of a given species. This index is the average height, in feet, that the trees attain in a specified number of years. This index applies to fully stocked, even-aged, unmanaged stands. Site index values given in table 5 are based on standard procedures and techniques *(9, 11, and 15)*.

The *productivity class* represents an expected volume produced by the most important trees, expressed in cubic meters per hectare per year. Cubic meters per hectare can be converted to cubic feet per acre by multiplying by 14.3. It can be converted to board feet by multiplying by a factor of about 71. For example, a productivity class of 8 means the soil can be expected to produce 114 cubic feet per acre per year at the point where mean annual increment culminates, or about 568 board feet per acre per year.

Trees to plant are those that are used for reforestation or, if suitable conditions exist, natural regeneration. They are suited to the soils and will produce a commercial wood crop. Desired product, topographic position (such as a low, wet area), and personal preference are three factors of many that can influence the choice of trees to use for reforestation.

Rangeland and Grazeable Woodlands

R. Gregory Hendricks, range conservationist, Soil Conservation Service, helped to prepare this section.

Native forages can provide an economical alternative to high maintenance tame pasture forages for livestock producers. Native forages are on a variety of sites from extremely droughty sandhills to marshlands. Typically, native forages are most productive in areas that are considered too wet for other uses without implementing water control and drainage practices. A native forage resource can be obtained on about 96,000 acres in Seminole County. About 32,000 acres is used strictly for rangeland purposes while 64,000 acres is used primarily for woodland products *(17)*.

Rangeland

The dominant native forage plants that naturally grow on a soil are generally the most productive and the most suitable for livestock. These dominant native forage plants will maintain themselves as long as the environment does not change. These plants are grouped into three categories according to their response to grazing—decreasers, increasers, and invaders.

Decreasers generally are the most abundant and most palatable plants on a given range site in good and excellent condition. They decrease in abundance if the rangeland is under continuous heavy grazing.

Increasers are less palatable to livestock. They increase for a short time under continuous heavy grazing, but they too eventually decrease.

Invaders are native to rangelands in small amounts. They have very little forage value, so they tend to increase and become the new dominant plants as the decreaser and increaser plants have been grazed out.

Range condition is determined by comparing the present plant community with the potential native composition of a particular range site. The more closely the existing community resembles its potential, the better the range condition. Range condition is an ecological rating only. It does not have a specific meaning that pertains to the present plant community in a given use. Four condition classes are used to measure range condition. These are—

- Excellent condition—producing 76 to 100 percent of the potential
- Good condition—producing 51 to 75 percent of the potential
- Fair condition—producing 26 to 50 percent of the potential
- Poor condition—producing 0 to 25 percent of the potential

Approximately 90 percent of rangeland in Florida is in less than satisfactory condition or in poor and fair condition. Table 6 shows for each soil the range site name and the potential annual production in favorable, average, and unfavorable growing seasons. Annual forage production refers to the amount of forage, in pounds per acre, that can be expected to grow on a well managed rangeland in good to excellent condition.

The productivity of range sites is closely related to the natural drainage of the soil. The wettest soils, such as those in freshwater and saltwater marshes, produce the most vegetation (fig. 12). The deep droughty soils of the sandhills normally produce the least amount of forage annually.

Management of the range sites should be planned with the potential productivity in mind. Sites with the highest production potential should be given highest priority if economic considerations are important.

Major management considerations revolve around livestock grazing. The objective in range management is to control grazing so that the native plants growing on a site are about the same in kind and amount as the potential native composition for that site. Such management generally results in the optimum production of vegetation, the conservation of water, and the control of erosion. The length of time that the sites are grazed, the time of year that they are grazed, the length of time and the season that the sites are rested, the grazing pattern of livestock within a pasture that contains more than one range site, and the palatability of the dominant plants within the site are basic management considerations if the rangeland is to be improved or maintained.

Rangeland improvement practices, such as mechanical brush control, controlled burning, and especially controlled livestock grazing, benefit Florida's rangeland. Predicting the effects of these practices is of utmost importance. Proper management results in maximum sustained production, conservation of the soil and water resources, and improvement of the habitat for many wildlife species.

The soils in Seminole County are assigned to one of six range sites. The range sites are Freshwater Marshes and Ponds, Longleaf Pine-Turkey Oak Hills, Sand Pine Scrub, Salt Marsh, Slough, and South Florida Flatwoods. A brief description of these sites follows.

Freshwater Marshes and Ponds—Some Basinger, Brighton, Canova, Felda, Floridana, Holopaw, Hontoon, Manatee, Nittaw, Okeelanta, Samsula, Sanibel, and Terra Ceia soils (map units 10, 11, 12, 15, 17, 19, 21, 22, 23, and 33) are included in this range site. These soils have a potential for producing significant amounts of maidencane. Chalky bluestem and blue maidencane dominate some of the drier edges of this site. The water level fluctuates throughout the year; thus, grazing is naturally deferred when the water level is high. Forage production increases during the rest period. This range site is preferred by cattle because of the high quantity and quality of the forage.

Longleaf Pine-Turkey Oak Hills—Apopka Astatula, Millhopper, and Tavares soils (map units 4, 5, 6, 7, 8, 31, and 32) are in this range site. These soils have moderately low potential for producing high quality forage. Natural fertility is low because of the rapid movement of plant nutrients and water through the soil. Because the quantity and quality of forage are poor, cattle do not readily graze this range site if other sites are available.

Sand Pine Scrub—Paola and St. Lucie soils (map unit 24) are in this range site. These soils have limited potential for producing native forage. The plant community consists of a fairly dense stand of sand pines and a dense woody understory. Cattle do not graze this range site if other sites are available.

Salt Marsh—Felda soil (map unit 14) is in this range site. This soil has the potential for producing significant amounts of smooth cordgrass, marshhay cordgrass, seashore saltgrass, and numerous other grasses and

Figure 12.—A great amount of native vegetation is produced on Basinger and Smyrna fine sands, depressional, in this freshwater marsh.

forbs for forage. This range site can provide good grazing for cattle.

Slough—Some Basinger, Delray, Malabar, Pineda, and Pompano soils (map units 9, 18, 25, and 28) are in this range site. These soils have the potential for producing significant amounts of blue maidencane, chalky bluestem, and various panicums. Carpetgrass, an introduced species, tends to become dominant if the site is overgrazed. This range site is a preferred grazing area.

South Florida Flatwoods—Most Adamsville, EauGallie, Immokalee, Myakka, Pomello, Seffner, Sparr, St. Johns, and Wabasso soils (map units 2, 13, 16, 20, 27, 29, 30, and 35) are in this range site. These soils have the potential for producing significant amounts of creeping bluestem, indiangrass, chalky bluestem, various panicums, and numerous legumes and forbs. If the range site is allowed to deteriorate, saw palmetto and pineland threeawn become dominant.

Grazeable Woodlands

Grazeable woodlands are forests that have an understory of native grasses, legumes, and forbs. The understory is an integral part of the forest plant community. The native plants can be grazed without significantly impairing other forest values. On such forest land, grazing is compatible with timber management if it is controlled or managed so that timber and forage resources are maintained or enhanced.

Understory vegetation consists of grasses, forbs, shrubs, and other plants within the reach of livestock or of grazing or browsing wildlife. A well managed wooded area can produce enough understory vegetation to support optimum numbers of livestock or wildlife, or both.

Forage production varies according to the different kinds of grazeable woodland; the amount of shade cast by the canopy; the accumulation of fallen needles; the influence of time and intensity of grazing on the presence or absence of grass species and forage production; and the number, size, and spacing and the method of site preparation of tree plantings.

Town and Country Planning

Albert Furman, soil scientist, Seminole County Soil and Water Conservation District, helped to prepare this section.

The population of Seminole County has greatly increased in the past few years. In 1970, the population was 83,700; and in 1984, it was 214,900 *(17)*. This increase to a large extent is the result of the proximity of Disney World, Sea World, and other entertainment and recreation centers. Projections tell us that the population will double in the next few years. As population increases, greater demands are made for schools, churches, shopping centers, and associated facilities. As cities enlarge, serious land use and pollution problems frequently develop.

From early settlement until now, the locations of towns, rural houses, citrus groves, cattle ranches, and roads and highways normally followed soil patterns that imposed the least restrictions. The rapid expansion of population in Seminole County is forcing these land uses onto less desirable sites. As this happens, more effort is needed to overcome the greater limitations. Land use planning provides a logical base for the rapid change that was a function of natural selection when land was plentiful and people were few. Sound land use planning considers the physical limitations and hazards of an area and makes adequate provisions to overcome them. It considers the onsite problems of the specific soil and the interrelationship between soils of entire land areas.

While many factors other than soils are important in planning for orderly development, soil quality is a basic and continuing factor. It demands full consideration, not only as a guide in determining use but also as a measure of the kind and magnitude of problems that must be overcome for specific uses. While it may not be practicable to put all soils to their best possible use, full knowledge of the problems that must be solved permits deliberate adjustment in use (fig. 13).

Farmers have long recognized the importance of selecting crops suited to the soils. They also know that management practices are strongly affected by soil conditions. Similar interpretations can be applied to soils information for use in town and country planning. Soil qualities are equally important in planning for industrial, recreational, residential, and related urban uses. The same soil characteristics and qualities that affect the kinds of crops and farming practices are also significant to nonfarm uses. The decisions on urban uses, however, are not necessarily determined on the basis of suitability. Instead, the physical characteristics and qualities of the soil become paramount, and interpretations are more directly concerned with the limitations, restrictions, or hazards and suggests corrective practices needed to prevent serious mistakes—only some of which can be adequately corrected later.

This section presents some of the basic facts about the soils in Seminole County and their relationship to sound planning that should logically follow three fundamental steps:

An *overall study* of general soil conditions within a large area;

A *careful study* of the individual soils as classified and mapped in a detailed soil survey;

Specific *onsite investigations* are necessary after planning has progressed to the point of applying specific uses to an area. Even detailed soil surveys have inclusions of other soils within a mapped area. These inclusions may have soil characteristics that would adversely affect foundations, septic tank absorption fields, roadbeds, and other uses.

Interpretations of soil information made in this survey may be used in the *overall study* of soil conditions and in the *careful study* of the individual soils. The overall study can be accomplished by applying information in the section describing the general soil map units to the general soil map in the back of this publication. The careful study requires application of information in the tables to the detailed soil maps in the back of this publication.

In Seminole County, soils are rated in terms of limitations, restrictions, or hazards for many uses by considering properties of the soils significant to the rating. These properties can be observed in the field or measured in the laboratory. Some are basic soil characteristics, such as slope and available water capacity. Others are soil qualities that are the manifestation of interactions between basic soil characteristics. Permeability, for example, is a soil quality that is the manifestation of soil texture, structure, and density.

Some soil properties, such as slope and wetness, affect practically all uses to an important degree. Others, such as corrosion potential, are of considerable importance to only one of the specified uses—and then only under certain conditions. Some have an abstract value that may be altered when considered in relationship to other characteristics. The relative importance of any particular soil quality varies from one use to another. For example, the slope of the land has a very important bearing on septic tank absorption fields but is of limited importance to wildlife uses.

Space requirements of a growing population create competition for the use of the land. Many factors influence decisions on the best use. Without

Figure 13.—This planned development is within the Myakka-EauGallie-Urban land soil map unit and is adjacent to the St. Johns River.

consideration of the underlying causes, development may follow reasonably well defined intensity patterns that involve change from low intensity use to higher intensity use. Generally, intensity in use ascends from forest to improved pasture, to cultivation, to suburban residential, and then to urban residential and industrial. Some soils can easily support this entire sequence of uses. Others, however, have limitations that seriously restrict them for one or more of these uses.

Some map units, such as Paola-St. Lucie sands, 0 to 5 percent slopes, may have very low capability for woodland, range, or cultivated crops and yet have only minor limitations for urban development. Otherwise, map units such as Canova and Terra Ceia mucks, if drained, have high potential for some cultivated crops and yet are poorly suited to woodland or have very severe restrictions for residential uses. A few soils have such extreme limitations that they would have to be greatly altered before they could be used for a desired purpose.

Under the pressures of urban expansion, changes in land use have been progressively toward the more intensive uses. Although economics, relative location, and other factors are involved, soil quality has a basic influence that cannot be ignored without creating difficult problems. Changes in land use made without considering soils and their capability endanger irreplaceable cropland. Not only is the highest or best practicable use involved but also the number or choice of alternatives. Enlightened decisions regarding proper use can be made only by considering basic information about the soils.

Limitations, restrictions, and hazards to a number of important uses of the soils in town and country planning are considered in the following sections. Tables 10 and 9 show the soil limitations in building site development and the construction of sanitary facilities. They also indicate the chief limiting properties of the soils. The degree of limitations shown in these tables, based on all soil characteristics, is stated. More detailed explanations of specific uses are included in the following sections.

Recreation

In table 7, the soils of the survey area are rated according to the limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreational use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 7, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations, if any, are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 7 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 10 and interpretations for dwellings without basements and for local roads and streets in table 9.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have gentle slopes and are not wet or subject to flooding during the period of use. The surface absorbs rainfall readily but remains firm and is not dusty when dry. Strong slopes can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is firm after rains and is not dusty when dry.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

John F. Vance, Jr., biologist, Soil Conservation Service, helped to prepare this section.

Wildlife habitat has been severely impacted by the intense urbanization of Seminole County. Quality habitat remains in only a few isolated pockets, mainly, in the wetlands along the St. Johns River and the Wekiva River. Deer, raccoon, opposum, squirrels, rabbits, woodpeckers, owls, alligators, otters, and a variety of songbirds, wading birds, reptiles, and amphibians are in these areas. Suitable habitat becomes more scarce each year, and only species that can adapt to suburban development can maintain populations.

Fishery habitat is in a much better condition although the water quality problems associated with urban development have impacted here. In Seminole County are l84 named lakes. Seventeen of these lakes cover more than 100 acres. Lake Jessup, which covers more than 10,000 acres, is the largest. The St. Johns River forms the eastern and northern boundaries of the county and provides excellent fishing. Important fish species include largemouth bass, bluegill, redear and red breast sunfish, black crappie, chain pickerel, and several species of catfish.

Several endangered or threatened species are in Seminole County. These species range from the rare indigo snake to more commonly known species, such as the wood stork and bald eagle. A more detailed list of these species with information on range and habitat needs is available from the local office of the Soil Conservation Service.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 8, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, millet, and grain sorghum.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are bahiagrass, lovegrass, Florida beggarweed, clover, and sesbania.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, goldenrod, Florida beggarweed, partridge pea, and bristlegrass.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, the available water capacity, and wetness. Examples of these plants are oak, saw palmetto, wild grape, sweetgum, cabbage palm, apple, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are wild plum, firethorn, and waxmyrtle.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, cypress, cedar, and juniper.

Wetland plants are annual and perennial, wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, and slope. Examples of wetland plants are smartweed, pickerelweed, cordgrass, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas include bobwhite quail, dove, meadowlark, field sparrow, cottontail, and red fox.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, thrushes, woodpeckers, squirrels, gray fox, raccoon, deer, and bear.

Habitat for wetland wildlife consists of open, marshy, or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, egrets, herons, shore birds, alligator, mink, and beaver.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building site development, Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet, and because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations must be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to: evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 9 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations, if any, are minor and easily overcome; *moderate* if soil properties or site features are moderately favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if one or more of the soil properties or site features are unfavorable for the use, and overcoming the unfavorable properties requires special design, extra maintenance, or alteration.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer, stone content, soil texture, and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

Dwellings and small commercial buildings are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. Depth to a high water table and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 to 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material, a base of gravel, crushed rock, or stabilized soil material, and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, and depth to a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, depth to a high water table, the available water capacity in the upper 40 inches, and the content of salts affect plant growth. Flooding, wetness, slope, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 10 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations, if any, are minor and easily overcome; *moderate* if soil properties or site features are moderately favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if one or more of the soil properties or site features are unfavorable for the use, and overcoming the unfavorable properties requires special design, extra maintenance, or alteration.

Table 10 also shows the suitability of the soils for use as daily cover for landfills. A rating of *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, depth to a high water table, and flooding affect absorption of the effluent.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local and State ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 10 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, depth to a high water table, flooding, and content of organic matter.

Excessive seepage due to rapid permeability of the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope can cause construction problems.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground water pollution. Ease of excavation and revegetation needs to be considered.

The ratings in table 10 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to a water table, slope, and flooding affect both types of landfill. Texture, highly organic layers, soil reaction, and content of salts affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy soils are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 11 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil.

They are rated as a probable or improbable source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by a high water table and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, low shrink-swell potential, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have moderate shrink-swell potential. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10 or a high shrink-swell potential. They are wet, and the depth to the water table is less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 11, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil) and the thickness of suitable material. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is less than 12 percent silty fines. This material must be at least 3 feet thick. All other soils are rated as an improbable source.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, and toxic material.

Soils rated *good* have friable, loamy material to a depth of at least 40 inches. They have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of soluble salts, or have a seasonal water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and releases a variety of plant-available nutrients as it decomposes.

Water Management

Table 12 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations, if any, are minor and are easily overcome; *moderate* if soil properties or site features are moderately favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if one or more of the soil properties or site features are unfavorable for the use. Special design, possibly increased maintenance, or alteration are required.

This table also gives the restrictive features that affect each soil for drainage, irrigation, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and the salinity of the soil.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; and subsidence of organic layers. Excavating and grading and the stability of ditchbanks are affected by slope and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The performance of a system is affected by the depth of the root zone, the amount of salts, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to reduce erosion and conserve moisture by intercepting runoff. Slope and wetness affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Wetness and slope affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classifications, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 13 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system *(2)* and the system adopted by the American Association of State Highway and Transportation Officials *(1)*.

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

Rock fragments larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area, or from nearby areas, and on field examination.

Physical and Chemical Properties

Table 14 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate, or component, consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They influence the soil's adsorption of cations, moisture retention, shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3 bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of movement of water through the soil when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage in each major soil layer is stated in inches of water per inch of soil. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Salinity is a measure of soluble salts in the soil at saturation. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of soils in individual fields can differ greatly from the value given in the table. Salinity affects the suitability of a soil for crop production, the stability of soil if used as construction material, and the potential of the soil to corrode metal and concrete.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion. Losses are expressed in tons per acre per year. These estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.02 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur over a sustained period without affecting crop productivity. The rate is expressed in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to wind erosion in cultivated areas. The groups indicate the susceptibility of soil to wind erosion and the amount of soil lost. Soils are grouped according to the following distinctions:

1. Sands, coarse sands, fine sands, and very fine sands. These soils are generally poorly suited to crops. They are extremely erodible, and vegetation is difficult to reestablish after cultivation.

2. Loamy sands, loamy fine sands, and loamy very fine sands. These soils are very highly erodible. Crops can be grown if intensive measures to control wind erosion are used.

3. Sandy loams, coarse sandy loams, fine sandy loams, and very fine sandy loams. These soils are highly erodible. Crops can be grown if intensive measures to control wind erosion are used.

4L. Calcareous loamy soils that are less than 35 percent clay and more than 5 percent finely divided calcium carbonate. These soils are erodible. Crops can be grown if intensive measures to control wind erosion are used.

4. Clays, silty clays, clay loams, and silty clay loams that are more than 35 percent clay. These soils are moderately erodible. Crops can be grown if measures to control wind erosion are used.

5. Loamy soils that are less than 18 percent clay and less than 5 percent finely divided calcium carbonate and sandy clay loams and sandy clays that are less than 5 percent finely divided calcium carbonate. These soils are slightly erodible. Crops can be grown if measures to control wind erosion are used.

6. Loamy soils that are 18 to 35 percent clay and less than 5 percent finely divided calcium carbonate, except silty clay loams. These soils are very slightly erodible. Crops can easily be grown.

Organic matter is the plant and animal residue in the soil at various stages of decomposition.

In table 14, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter of a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 15 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

In table 15, some soils are assigned two hydrologic soil groups. Soils that have a seasonal high water table but can be drained are assigned first to a hydrologic soil group that denotes the drained condition of the soil and then to a hydrologic group that denotes the undrained condition, for example, B/D. Because there are different degrees of drainage and water table control, onsite investigation is needed to determine the hydrologic group of the soil in a particular location.

Flooding, the temporary covering of the soil surface by flowing water, is caused by overflowing streams, by runoff from adjacent slopes, or by inflow from high tides. Shallow water standing or flowing for short periods after rainfall or snowmelt is not considered flooding. Standing water in swamps and marshes or in a closed depression is considered ponding.

Table 15 gives the frequency and duration of flooding and the time of year when flooding is most likely to occur.

Frequency, duration, and probable dates of occurrence are estimated. Frequency generally is expressed as *none, occasional,* or *frequent. None* means that flooding is not probable. *Occasional* means that flooding occurs infrequently under normal weather conditions (there is a 5 to 50 percent chance of flooding in any year). *Frequent* means that flooding occurs often under normal weather conditions (there is more than a 50 percent chance of flooding in any year). Duration is expressed as *brief* (2 to 7 days), *long* (7 days to 1 month), and *very long* (more than 1 month). The time of year that floods are most likely to occur is expressed in months. June-November, for example, means that flooding can occur during the period June through November. About twothirds to three-fourths of all flooding occurs during the stated period.

The information on flooding is based on evidence in the soil profile, namely, thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons, which are characteristic of soils that are not subject to flooding.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 15 are the depth to the seasonal high water table; the kind of water table, that is, *perched* or *apparent;* and the months of the year that the water table commonly is highest. A water table that is seasonally high for less than 1 month is not indicated in table 15.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

The two numbers in the "High water table-Depth" column indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot. The first numeral in the range indicates the highest water level. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. "More than 6.0" indicates that the water table is below a depth of 6 feet or that the water table exists for less than a month.

Subsidence is the settlement of organic soils or of saturated mineral soils of very low density. Subsidence results from either desiccation and shrinkage or oxidation of organic material, or both, following drainage. Subsidence takes place gradually, usually over a period of several years. Table 15 shows the expected initial subsidence, which usually is a result of drainage, and total subsidence, which results from a combination of factors.

Not shown in the table is subsidence caused by an imposed surface load or by the withdrawal of ground water throughout an extensive area as a result of lowering the water table.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severely corrosive environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and the amount of sulfates in the saturation extract.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(14)*. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or on laboratory measurements. Table 16 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Spodosol.

SUBORDER. Each order is divided into suborders, primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aquod (*Aqu*, meaning water, plus *od*, from Spodosol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Haplaquods (*Hapl*, meaning minimal horizonation, plus *aquod*, the suborder of the Spodosols that has an aquic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Haplaquents.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is sandy, siliceous, hyperthermic, Typic Haplaquods.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. There can be some variation in the texture of the surface layer or of the substratum within a series.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the *Soil Survey Manual (12)*. Many of the technical terms used in the descriptions are defined in *Soil Taxonomy (14)*. Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Adamsville Series

The Adamsville series consists of soils that are somewhat poorly drained. These soils formed in sandy marine sediment. They are on the lower slopes on the uplands and on low knolls on the flatwoods. The slopes are less than 2 percent. Adamsville soils are hyperthermic, uncoated Aquic Quartzipsamments.

Adamsville soils are closely associated with Immokalee, Pomello, Pompano, Seffner, Sparr, and Tavares soils. Immokalee and Pomello soils have a spodic horizon. Pompano soils are poorly drained and are in lower positions on the landscape than Adamsville soils. Seffner soils have an umbric epipedon. Sparr soils have an argillic horizon. Tavares soils are moderately well drained and are in higher positions on the landscape than Adamsville soils.

Typical pedon of Adamsville fine sand, in an area of Adamsville-Sparr fine sands; 1 mile east of Chuluota, 1,900 feet north and 600 feet west of the southeast corner of sec. 21, T. 21 S., R. 32 E.

A—0 to 4 inches; grayish brown (10YR 5/2) fine sand; dark organic matter mixed with light gray sand grains; weak fine granular structure; friable; many fine, medium, and coarse roots; medium acid; clear smooth boundary.

C1—4 to 28 inches; light grayish brown (10YR 6/2) fine sand; few fine distinct brownish yellow (10YR 6/6) mottles; single grained; loose; common fine roots; many uncoated sand grains; slightly acid; gradual wavy boundary.

C2—28 to 45 inches; very pale brown (10YR 7/4) fine sand; common fine and medium distinct brownish yellow (10YR 6/6) mottles; single grained; loose; well coated sand grains in mottled parts, uncoated sand grains in matrix; slightly acid; gradual wavy boundary.

C3—45 to 80 inches; light gray (10YR 7/1) fine sand; single grained; loose; mildly alkaline.

The reaction ranges from very strongly acid to mildly alkaline. The texture is sand or fine sand to a depth of 80 inches or more. The content of silt plus clay is less than 5 percent in the control section.

The Ap or A horizon has hue of 10YR, value of 3 to 5, and chroma of 1 or 2. The thickness of this horizon is 3 to 7 inches.

The C horizon has hue of 10YR, value of 5 to 8, and chroma of 1 to 4. Mottles in shades of gray, yellow, and brown range from few to many. Mottles or matrix chroma indicative of wetness are within 36 inches of the surface.

Apopka Series

The Apopka series consists of soils that are nearly level to strongly sloping and well drained. These soils formed in sandy and loamy marine sediment. They are on ridges and hillsides on the uplands. The slopes range from 0 to 12 percent. Apopka soils are loamy, siliceous, hyperthermic Grossarenic Paleudults.

Apopka soils are closely associated with Astatula, Millhopper, Paola, St. Lucie, and Tavares soils. The associated soils do not have an argillic horizon except for Millhopper soils. In addition, Millhopper soils have a seasonal high water table at a depth of 40 to 60 inches in most years.

Typical pedon of Apopka fine sand, in an area of Astatula-Apopka fine sands, 5 to 8 percent slopes; about 4 miles southeast of Lake Mary, 700 feet east and 100 feet south of the northwest corner of sec. 24, T. 20 S., 29 E.

Ap—0 to 6 inches; gray (10YR 5/1) fine sand; weak fine granular structure; friable; few fine roots; slightly acid; clear wavy boundary.

E1—6 to 20 inches; yellow (10YR 7/6) fine sand; single grained; loose; few fine roots; many uncoated sand grains; medium acid; gradual wavy boundary.

E2—20 to 65 inches; very pale brown (10YR 7/3) fine sand; single grained; loose; few fine distinct yellow (10YR 7/6) fine sand lamellae; many fine roots; many uncoated sand grains; strongly acid; abrupt wavy boundary.

Bt—65 to 80 inches; reddish yellow (7.5YR 6/6) sandy clay loam; weak fine subangular blocky structure; firm; few fine roots; few fine pores; thin patchy clay films on faces of peds and on walls of pores; sand grains coated and bridged with clay; strongly acid.

The thickness of the solum is more than 60 inches. The reaction ranges from very strongly acid to medium acid except where the Ap horizon has been limed.

The A or Ap horizon has hue of 10YR, value of 2 to 5, and chroma of 1 or 2. The texture is sand or fine sand. The thickness of this horizon is 4 to 8 inches.

The E horizon has hue of 10YR, value of 5 to 7, and chroma of 3 to 8. Some pedons have gray or white mottles because of uncoated sand grains. Other pedons have mottles and lamellae in shades of brown, red, or yellow. The texture of the E horizon is sand or fine sand. The combined thickness of the A and E horizons is more than 40 inches.

The Bt horizon has hue of 2.5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. The texture is loamy fine sand, sandy loam, or sandy clay loam. The Bt horizon extends to a depth of 60 to 80 inches or more.

Astatula Series

The Astatula series consists of soils that are nearly level to strongly sloping and excessively drained. These soils formed in thick deposits of marine sand. They are on ridges and hillsides on the uplands. The water table is at a depth of more than 60 inches. The slopes range from 0 to 12 percent. Astatula soils are hyperthermic, uncoated Typic Quartzipsamments.

Astatula soils are closely associated with Apopka, Millhopper, Paola, St. Lucie, and Tavares soils. Apopka and Millhopper soils have an argillic horizon. Paola soils have an albic horizon underlain by a horizon that has value that is at least one unit darker. St. Lucie soils have value of 7 or 8 and chroma of 2 or less in the C horizon. Tavares soils are moderately well drained.

Typical pedon of Astatula fine sand, in an area of Astatula-Apopka fine sands, 8 to 12 percent slopes; 2 miles west of Lake Mary, 700 feet east and 200 feet south of the northwest corner of sec. 18, T. 20 S., R. 30 E.

Ap—0 to 3 inches; light gray (10YR 7/1) fine sand; single grained; loose; many fine and medium roots; many uncoated sand grains; mixture of gray sand and organic matter in upper 1 inch; strongly acid; clear wavy boundary.
C1—3 to 40 inches; very pale brown (10YR 7/3) fine sand; single grained; loose; few fine roots in upper part; few fine streaks of light gray sand grains; many uncoated sand grains; strongly acid; gradual wavy boundary.
C2—40 to 80 inches; very pale brown (10YR 8/3) fine sand; single grained; loose; few uncoated white (10YR 8/1) sand grains; strongly acid.

Sand or fine sand extends to a depth of 80 inches or more. The content of silt plus clay between depths of 10 and 40 inches is less than 5 percent. The reaction ranges from very strongly acid to slightly acid.

The A or Ap horizon has hue of 10YR, value of 3 to 7, and chroma of 1 or 2. The thickness of this horizon is 2 to 6 inches.

Some pedons have a transitional AC horizon that is 2 to 5 inches thick. This horizon has hue of 10YR, value of 6 or 7, and chroma of 3 or 4.

The C horizon has hue of 10YR, value of 5 to 8, and chroma of 3 to 8. In some pedons, the C horizon has mottles that are in shades of gray to white. These mottles are not indicative of wetness but are the colors of the sand grains.

Basinger Series

The Basinger series consists of soils that are poorly drained and very poorly drained. These soils formed in sandy marine sediment. They are in sloughs, depressions, or poorly defined drainageways. The slopes are less than 2 percent. Basinger soils are siliceous, hyperthermic Spodic Psammaquents.

Basinger soils are closely associated with Delray, EauGallie, Hontoon, Immokalee, Myakka, Nittaw, Okeelanta, Pompano, Samsula, and Smyrna soils. Delray, EauGallie, and Nittaw soils have an argillic horizon; in addition, EauGallie soils also have a spodic horizon. Immokalee, Myakka, and Smyrna soils have a spodic horizon. Hontoon, Okeelanta, and Samsula soils are organic soils. Pompano soils do not have spodic properties.

Typical pedon of Basinger fine sand, in an area of Basinger and Delray fine sands; about 6 miles east of Chuluota, 2,200 feet east and 800 feet north of the southeast corner of sec. 28, T. 21 S., R. 33 E.

A—0 to 5 inches; very dark gray (10YR 3/1) fine sand; dark organic matter mixed with light gray sand grains; weak fine granular structure; very friable; strongly acid; clear smooth boundary.
E—5 to 30 inches; light gray (10YR 6/1) fine sand; single grained; loose; few fine and medium roots; very strongly acid; clear wavy boundary.
Bh/E—30 to 50 inches; dark grayish brown (10YR 4/2) fine sand and light gray (10YR 7/1) fine sand; common medium distinct black (10YR 2/1) weakly cemented bodies; single grained; loose; strongly acid; gradual wavy boundary.
C—50 to 80 inches; gray (N 6/0) fine sand; single grained; loose; many uncoated sand grains; strongly acid.

The thickness of sand or fine sand is more than 80 inches. The reaction ranges from extremely acid to neutral.

The A horizon has hue of 10YR, value of 2 to 6, and chroma of 1. The texture is dominantly fine sand or sand; however, in depressional areas, the surface texture is mucky fine sand. The thickness of this horizon is 4 to 9 inches.

The E horizon has hue of 10YR, value of 5 to 8, and chroma of 1 or 2. In some pedons, a thin transitional EB horizon is between the E and Bh/E horizons. The thickness of the E horizon is 10 to 30 inches.

The B part of the Bh/E horizon has hue of 10YR, value of 4 or 5, and chroma of 2. The E part of the Bh/E horizon has color similar to that of the E horizon. Few to many mottles or weakly cemented bodies that have hue of 10YR, value of 2 or 3, and chroma of 1 or 2 are in the Bh part of this horizon. Some pedons have a thin discontinuous Bh horizon that has colors similar to those in the Bh part of the Bh/E horizon. The Bh/E horizon is less than 30 inches thick.

The C horizon has hue of 10YR to 5Y, value of 4 to 8, and chroma of 1 or 2; or it is neutral and has value of 5 to 8. The C horizon extends to a depth of 80 inches or more.

Brighton Series

The Brighton series consists of organic soils that are deep and very poorly drained. These soils formed mainly in the remains of woody plants. They are in depressions and freshwater marshes and swamps. The slopes are less than 2 percent. Brighton soils are dysic, hyperthermic Typic Medihemists.

Brighton soils are closely associated with Basinger, Samsula, Sanibel, Smyrna, and St. Johns soils. Basinger, Sanibel, Smyrna, and St. Johns soils are mineral soils. Samsula soils have sandy mineral material that is within 50 inches of the surface.

Typical pedon of Brighton muck, in an area of Brighton, Samsula, and Sanibel mucks; about 1.5 miles southwest of Oviedo, 1,800 feet south and 2,200 feet west of the northeast corner of sec. 21, T. 21 S., R. 31 E.

Oap—0 to 8 inches; black (10YR 2/1) muck; about 40 percent fiber, unrubbed, and 5 percent fiber, rubbed; weak fine granular structure; loose to friable; extremely acid; diffuse wavy boundary.

Oe—8 to 40 inches; very dark gray (5YR 3/1) mucky peat; about 25 percent fiber, rubbed, and 60 percent fiber, unrubbed; massive; friable; many identifiable remains of herbaceous and woody material; extremely acid; diffuse wavy boundary.

Oe2—40 to 80 inches; dark reddish brown (5YR 3/2) mucky peat; about 25 percent fiber, rubbed, and 60 percent fiber, unrubbed; massive; many identifiable remains of herbaceous and woody material; extremely acid.

The organic material is more than 51 inches thick. The reaction ranges from extremely acid to strongly acid. The pH is less than 4.5 in 0.01 molar calcium cloride. The sodium pyrophosphate extract colors have value of 3 or 4 and chroma of 1 to 3 in the Oa horizon and have value of 5 or 6 and chroma of 1 in the Oe horizon.

The Oa horizon has hue of 5YR to 10YR, value of 2 or 3, and chroma of 1 or 2. This horizon has significant amounts of undecomposed herbaceous and woody materials; but after rubbing, the fiber content is less than 16 percent. The thickness of this horizon is 6 to 12 inches.

The Oe horizon has hue of 5YR to 10YR, value 2 to 5, and chroma of 1 to 6. This horizon contains significant amounts of identifiable undecomposed herbaceous and woody materials. It is dominated by hemic material that is between 35 and 75 percent fiber content, unrubbed, and 16 to 40 percent fiber content, rubbed. This horizon extends to a depth of more than 51 inches.

Some pedons are underlain by a C horizon within 80 inches of the surface. This horizon has hue of 10YR, value of 4 to 6, and chroma of 1 or 2. The texture ranges from fine sand to sandy loam.

Canova Series

The Canova series consists of soils that are very poorly drained. These soil formed in loamy marine material below organic material. They are in depressions and freshwater swamps. The slopes are less than 2 percent. Canova soils are fine-loamy, siliceous, hyperthermic Typic Glossaqualfs.

Canova soils are closely associated with Felda, Floridana, Manatee, and Terra Ceia soils. Felda soils do not have an organic surface layer, and the combined thickness of the A and E horizons is 20 to 40 inches. Floridana and Manatee soils have a mollic epipedon. Terra Ceia soils formed in organic deposits that are more than 51 inches thick.

Typical pedon of Canova muck, in an area of Canova and Terra Ceia mucks; about 2 miles northeast of Oveido, 600 feet west and 1,000 feet north of the southeast corner of sec. 35, T. 20 S., R. 31 E.

Oa—0 to 10 inches; black (N 2/0) muck; about 40 percent fiber, unrubbed, 5 percent fiber, rubbed; massive; many fine roots; slightly acid; abrupt smooth boundary.

A—10 to 15 inches; black (10YR 2/1) fine sand; single grained; loose; few fine roots; slightly acid; gradual wavy boundary.

E—15 to 27 inches; gray (10YR 6/1) fine sand; single grained; loose; few fine roots; slightly acid; abrupt irregular boundary.

Btg/E—27 to 30 inches; dark gray (10YR 4/1) sandy loam; common medium distinct brownish yellow (10YR 6/6) mottles; weak coarse subangular blocky structure; friable; few coarse distinct tongues of dark gray (10YR 4/1) sand; sand grains coated and bridged with clay; neutral; gradual wavy boundary.

Btg—30 to 38 inches; dark greenish gray (5GY 4/1) sandy clay loam; common medium distinct dark yellowish brown (10YR 4/4) mottles; weak coarse subangular blocky structure; friable; sand grains coated and bridged with clay; neutral; gradual wavy boundary.

BCg—38 to 80 inches; greenish gray (5GY 6/1) sandy clay loam; common fine faint light gray (10YR 7/1) carbonatic materials; massive; friable; lenses of sandy loam and loamy sand; calcareous; moderately alkaline.

The reaction ranges from extremely acid to slightly acid in the Oa horizon, from medium acid to moderately alkaline in the A and E horizons, and from neutral to moderately alkaline in the Btg/E, Btg, and Cg horizons.

The Oa horizon has hue 5YR to 10YR, value of 2 or 3, and chroma of 1 or 2; or it is neutral and has value of 2. This horizon contains significant amounts of undecomposed herbaceous and woody materials; but after rubbing, the fiber content is less than 16 percent. The thickness of the organic material ranges from 5 to 15 inches.

The A horizon has hue of 10YR; or it is neutral and has value of 2 to 5. The texture is sand or fine sand. The thickness of the A horizon ranges from 3 to 10 inches.

The E horizon has hue of 10YR, value of 4 to 7, and chroma of 1 or 2. The texture is sand or fine sand. The combined thickness of the A and E horizons is less than 20 inches.

The Btg horizon and the Btg part of the Btg/E horizon have hue of 10YR to 5GY, value of 4 to 6, and chroma of 1 or 2. Some horizons have mottles in shades of yellow and brown. The E part of the Btg/E horizon has the same texture, hue, value, and chroma as the E horizon. The texture of the Btg horizon is sandy loam or sandy clay loam. The Btg horizon is 5 to 20 inches thick.

The BCg horizon has about the same colors as the Btg horizon. The texture is sandy loam or sandy clay loam and has lenses of sand, loamy sand, and sandy loam. Few and common, fine and medium, soft and hard, light gray and white fragments of carbonatic material are in the BCg horizon.

Delray Series

The Delray series consists of soils that are very poorly drained. These soils formed in sandy and loamy marine sediment. They are in sloughs and on broad, low plains on the flatwoods. The slopes are less than 2 percent. Delray soils are loamy, siliceous, hyperthermic Grossarenic Argiaquolls.

Delray soils are closely associated with Basinger, EauGallie, Holopaw, Felda, Malabar, and Smyrna soils. Basinger and Smyrna soils do not have an argillic horizon. EauGallie soils have a spodic horizon. Felda, Holopaw, and Malabar soils do not have a mollic epipedon. In addition, Felda soils have an argillic horizon that is within 40 inches of the surface.

Typical pedon of Delray fine sand, in an area of Basinger and Delray fine sands; about 1.5 miles north of Loch Arbor, 1,800 feet east and 2,000 feet north of the southwest corner of sec. 30, T. 19 S., R. 30 E.

A—0 to 12 inches; black (10YR 2/1) fine sand; weak fine granular structure; friable; many fine roots; about 5 to 10 percent organic matter; slightly acid; clear smooth boundary.

Eg—12 to 50 inches; light gray (10YR 7/2) fine sand; loose; common fine dark gray stains along root channels; many fine roots; common fine pores; neutral; abrupt wavy boundary.

Btg—50 to 80 inches; gray (10YR 6/1) sandy loam; weak fine granular structure; friable; most sand grains coated and bridged with clay, some sand grains uncoated; mildly alkaline.

The thickness of the solum is more than 60 inches. The reaction is medium acid to neutral in the A horizon, slightly acid or neutral in the E horizon, and neutral to mildly alkaline in the B horizon.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. The texture is fine sand or mucky fine sand that has an organic matter content of 2 to 18 percent. The thickness of the A horizon is 10 to 16 inches.

The Eg horizon has hue of 10YR, value of 4 to 7, and chroma of 2 or less. The texture is sand or fine sand. The combined thickness of the A and E horizons is more than 40 inches.

The Btg horizon has hue of 10YR, value of 4 to 6, and chroma of 1 or 2. The texture is sandy loam or fine sandy loam. The Btg horizon extends to a depth of 60 inches or more.

Some pedons have a BCg horizon within 80 inches of the surface. In pedons that have a BCg horizon, the color and texture are similar to that of the Btg horizon.

EauGallie Series

The EauGallie series consists of soils that are poorly drained. These soils formed in sandy and loamy marine sediment. They are on broad plains on the flatwoods. The slopes are less than 2 percent. EauGallie soils are sandy, siliceous, hyperthermic Alfic Haplaquods.

EauGallie soils are closely associated with Basinger, Felda, Immokalee, Malabar, Myakka, Smyrna, and St. Johns soils. Basinger, Immokalee, Myakka, Smyrna, and St. Johns soils do not have an argillic horizon. Felda and Malabar soils do not have a spodic horizon.

Typical pedon of EauGallie fine sand, in an area of Myakka and EauGallie fine sands; about 5 miles southeast of Sanford, 1,500 feet north and 1,000 feet west of the southeast corner of sec. 7, T. 20 S., R. 31 E.

A—0 to 5 inches; dark gray (10YR 4/1) fine sand; light gray sand grains mixed with black organic matter; weak fine granular structure; very friable; many fine and medium roots; very strongly acid; clear smooth boundary.

E1—5 to 10 inches; light gray (10YR 7/1) fine sand; single grained; loose; few fine and medium roots; very strongly acid; gradual wavy boundary.

E2—10 to 18 inches; light gray (10YR 7/1) fine sand; few fine distinct yellowish brown (10YR 5/4) mottles; single grained; loose; few fine and medium roots; strongly acid; abrupt wavy boundary.

Bh1—18 to 20 inches; black (10YR 2/1) fine sand; moderate medium granular structure; firm; common fine roots; sand grains coated with organic matter; medium acid; clear wavy boundary.

Bh2—20 to 25 inches; dark brown (7.5YR 3/2) fine sand; moderate medium granular structure; firm; few fine and medium roots; sand grains coated with organic matter; medium acid; clear wavy boundary.

Bh3—25 to 30 inches; black (10YR 2/1) fine sand; moderate medium granular structure; friable; sand grains coated with organic matter; medium acid; gradual wavy boundary.

BE—30 to 37 inches; dark brown (7.5YR 4/4) fine sand; weak fine granular structure; friable; few fine black (10YR 2/1) fragments; many uncoated sand grains; slightly acid; gradual wavy boundary.

E'—37 to 41 inches; light brownish gray (10YR 6/2) fine sand; single grained; loose; slightly acid; abrupt wavy boundary.

Btg—41 to 60 inches; very pale brown (10YR 7/3) sandy clay loam; weak medium subangular blocky structure; friable; sand grains coated and bridged with clay; slightly acid; gradual wavy boundary.

Cg—60 to 80 inches; light brownish gray (10YR 6/2) loamy sand that has pockets of fine sand and sandy loam; massive; loose to firm; slightly acid.

The thickness of the solum ranges from 46 to more than 80 inches. The depth to the Bt horizon is more than 40 inches. The reaction ranges from very strongly acid to medium acid in the A and E horizons, from very strongly acid to slightly acid in the Bh horizon, and from very strongly acid to mildly alkaline in all other horizons below the Bh horizon.

The A horizon has hue of 10YR, value of 2 to 4, and chroma of 1. The texture is sand or fine sand. The thickness of the A horizon is 4 to 9 inches.

The E horizon has hue of 10YR, value of 5 to 8, and chroma of 1 or 2. The texture is sand or fine sand. The combined thickness of the A and E horizons is less than 30 inches.

The Bh horizon has hue of 5YR to 10YR, value of 2 or 3, and chroma of 1 to 3. The texture is sand or fine sand. Sand grains are well coated with organic matter. The thickness of the Bh horizon is 10 to 22 inches.

In pedons that have a BE horizon, it has hue of 7.5YR or 10YR, value of 4 to 7, and chroma of 3 or 4. The texture of this horizon is sand or fine sand. The thickness of the BE horizon is 4 to 9 inches. In most pedons, this horizon has few or common, weakly cemented fragments of Bh material.

In pedons that have an E' horizon, it has hue of 10YR, value of 4 to 8, and chroma of 1 to 3. The texture is sand or fine sand. The thickness of the E' horizon is 3 to 7 inches.

The Btg horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 3 or less. The texture is sandy loam, fine sandy loam, or sandy clay loam. The content of clay averages 16 to 23 percent but is up to 35 percent in some subhorizons. The Btg horizon is 5 to 30 inches thick.

The Cg horizon has hue of 10YR to 5Y, value of 5 to 7, and chroma of 1 to 3. The texture ranges from fine sand to loamy fine sand.

Felda Series

The Felda series consists of soils that are poorly drained and very poorly drained. These soils formed in sandy and loamy marine sediment. They are in depressions and on the flood plains. The slopes are less than 2 percent. Felda soils are loamy, siliceous, hyperthermic Arenic Ochraqualfs.

Felda soils are closely associated with Floridana, Holopaw, Manatee, Nittaw, and Pineda soils. Floridana, Manatee, and Nittaw soils have a mollic epipedon. Holopaw soils have sandy A and E horizons that combined are more than 40 inches thick. Pineda soils have a Bw horizon.

Typical pedon of Felda mucky fine sand, in an area of Felda mucky fine sand, saline, frequently flooded; about 8 miles east of Chuluota, 2,000 feet east and 750 feet south of the northwest corner of sec. 34, T. 21 S., R. 33 E.

A—0 to 7 inches; black (10YR 2/1) mucky fine sand; weak fine granular structure; friable; many fine and medium roots; slightly acid; clear wavy boundary.

Eg1—7 to 20 inches; gray (10YR 6/1) fine sand; many fine faint light brownish gray streaks and mottles; single grained; loose; many fine roots; many clean sand grains; slightly acid; clear wavy boundary.

Eg2—20 to 25 inches; light gray (10YR 7/1) fine sand; single grained; loose; few fine and medium roots; slightly acid; clear wavy boundary.

Btg—25 to 39 inches; gray (N 6/0) sandy clay loam; common medium distinct brownish yellow (10YR 6/6) mottles; weak coarse subangular blocky structure; friable; slightly sticky, slightly plastic; few fine roots; few medium pores; clay bridging between some sand grains; thin patchy clay films on faces of peds; neutral; clear irregular boundary.

BCg—39 to 49 inches; gray (5Y 6/1) sandy loam; weak coarse subangular blocky structure; friable; pockets and lenses of fine sand and loamy fine sand; mildly alkaline; clear wavy boundary.

Cg—49 to 80 inches; gray (N 6/0) loamy sand; single grained; loose; narrow lenses and small pockets of gray fine sandy loam; mildly alkaline.

The thickness of the solum ranges from 30 to 80 inches. The reaction ranges from slightly acid to moderately alkaline.

The A horizon has hue of 10YR, value of 2 to 4, and chroma of 1 or 2. The texture is fine sand or mucky fine sand. The A horizon is 4 to 7 inches thick.

The Eg horizon has hue of 10YR, value of 4 to 7, and chroma of 1 or 2. Mottles of yellow or brown range from none to common. The texture is sand or fine sand. The combined thickness of the A and E horizons ranges from 20 to 40 inches.

The Btg horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 1 or 2; or it is neutral and has value of 4 to 7. Some pedons have mottles in shades of yellow or brown. The texture is sandy loam, fine sandy loam, or sandy clay loam. The thickness of the Btg horizon is 12 to 30 inches.

In some pedons, the BCg horizon has colors similar to those of the Btg horizon. The texture is loamy sand, loamy fine sand, or sandy loam. The thickness of the BCg horizon is 7 to 12 inches.

In some pedons, the Cg horizon has hue of 10YR to 5G, value of 4 to 8, and chroma of 2 or less; or it is neutral and has value of 4 to 8. Some pedons have mottles of higher or lower chroma. The texture is sand, fine sand, or loamy sand. The percent, by volume, of 2 to 10 millimeter shell fragments ranges from 0 to 10 percent.

Floridana Series

The Floridana series consists of soils that are very poorly drained. These soils formed in sandy and loamy marine sediment. They are on the flood plains. The slopes are less than 2 percent. Floridana soils are loamy, siliceous, hyperthermic Arenic Argiaquolls.

Floridana soils are closely associated with Felda, Holopaw, Manatee, and Nittaw soils. Felda and Holopaw soils do not have a mollic epipedon. Manatee and Nittaw soils have an argillic horizon that is within 20 inches of the surface.

Typical pedon of Floridana mucky fine sand, in an area of Manatee, Floridana, and Holopaw soils, frequently flooded; about 7 miles east of Chuluota, 2,000 feet west and 2,600 feet north of the southeast corner of sec. 21, T. 21 S., R. 33 E.

A1—0 to 8 inches; black (10YR 2/1) mucky fine sand; weak medium granular structure; friable; common fine and few medium roots; sand grains coated with organic matter; slightly acid; gradual smooth boundary.

A2—8 to 18 inches; black (10YR 2/1) fine sand; weak fine granular structure; friable; common fine roots; many fine faint gray sand pockets and streaks; slightly acid; clear wavy boundary.

Eg—18 to 29 inches; gray (10YR 6/1) fine sand; few medium prominent brownish yellow (10YR 6/6) mottles and common medium faint gray (10YR 5/1) mottles; single grained; loose; common medium roots; slightly acid; clear wavy boundary.

Btg—29 to 42 inches; gray (10YR 5/1) fine sandy loam; weak coarse subangular blocky structure; common fine and medium roots; few medium pores; sand grains coated and bridged with clay; mildly alkaline; gradual wavy boundary.

BCg—42 to 80 inches; gray (10YR 6/1) sandy loam; weak coarse subangular blocky structure; common fine and medium roots; few fine and medium pores; many uncoated sand grains; mildly alkaline.

The thickness of the solum ranges from 60 to more than 80 inches. The reaction ranges from very strongly acid to moderately alkaline.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. The texture is fine sand or mucky fine sand. The thickness of the A horizon is 10 to 20 inches.

The Eg horizon has hue of 10YR, value of 4 to 7, and chroma of 1 or 2. This horizon has few to common mottles in shades of brown or yellow. The texture is sand or fine sand. The combined thickness of the A and Eg horizons ranges from 20 to 40 inches.

The Btg and BCg horizons have hue of 10YR to 5Y, value of 4 to 7, and chroma of 2 or less. In some pedons, these horizons have mottles of gray, yellow, and brown. The Btg and BCg horizons extend to a depth of 60 inches or more. The texture is sandy loam, fine sandy loam, or sandy clay loam.

Holopaw Series

The Holopaw series consists of soils that are poorly drained. These soils formed in sandy marine sediment. They are on the flood plains. The slopes are less than 2 percent. Holopaw soils are loamy, siliceous, hyperthermic Grossarenic Ochraqualfs.

Holopaw soils are closely associated with Felda, Floridana, Malabar, Manatee, and Nittaw soils. Felda, Floridana, Manatee, and Nittaw soils have an argillic horizon that is within 40 inches of the surface. Malabar soils have a Bw horizon.

Typical pedon of Holopaw fine sand, in an area of Manatee, Floridana, and Holopaw soils, frequently flooded; about 9 miles east of Oviedo, 1,300 feet south and 2,000 feet west of the northeast corner of sec. 18, T. 21 S., R. 33 E.

A—0 to 6 inches; black (10YR 2/1) fine sand; weak fine granular structure; very friable; many fine and medium roots; slightly acid; gradual smooth boundary.

Eg1—6 to 19 inches; grayish brown (10YR 5/2) fine sand; weak fine granular structure; very friable; many fine roots; slightly acid; gradual smooth boundary.

Eg2—19 to 43 inches; gray (10YR 6/1) fine sand; common medium distinct pale brown (10YR 6/3) mottles; single grained; loose; common fine roots; slightly acid; gradual smooth boundary.

Eg3—43 to 50 inches; gray (10YR 5/1) fine sand; single grained; loose; few fine roots; slightly acid; gradual smooth boundary.

Btg—50 to 80 inches; gray (5Y 6/1)fine sandy loam; common medium distinct brown (10YR 4/3) mottles; weak medium subangular blocky structure; friable; few fine roots; clay bridging between sand grains; mildly alkaline.

The thickness of the solum ranges from 60 to more than 80 inches. The reaction ranges from strongly acid to neutral in the surface and subsurface layers and from strongly acid to moderately alkaline in the subsoil.

The A horizon has hue of 10YR or 2.5Y, value of 2 to 5, and chroma of 2 or less. The thickness of the A horizon is 4 to 10 inches; but if the value is 3 or less, the horizon is less than 7 inches thick. The texture of the A horizon is fine sand.

The Eg horizon has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 3 or less. The combined thickness of the A and E horizons ranges from 40 to 70 inches.

The Btg horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 2 or less. The texture is sandy loam, fine sandy loam, or sandy clay loam. In many pedons, this horizon has pockets and lenses of sand.

Hontoon Series

The Hontoon series consists of organic soils that are deep and very poorly drained. These soils formed in hydrophytic, nonwoody plant remains. They are in freshwater swamps and marshes. The slopes are less than 2 percent. Hontoon soils are dysic, hyperthermic Typic Medisaprists.

Hontoon soils are closely associated with Basinger, Brighton, Floridana, Manatee, Okeelanta, Samsula, and Terra Ceia soils. Basinger, Floridana, and Manatee soils formed in mineral materials. Brighton soils mainly have hemic material in the control section. Okeelanta and Samsula soils have sandy mineral material in the control section. Terra Ceia soils are in the euic family.

Typical pedon of Hontoon muck, in an area of Basinger, Samsula, and Hontoon soils, depressional; about 1.5 miles east of Buda, 1,200 feet east and 40 feet south of the northwest corner of sec. 35, T. 20 S., R. 32 E.

Oa1—0 to 18 inches; dark reddish brown (5YR 3/2) muck; about 20 percent fiber, unrubbed, 3 percent fiber, rubbed; weak medium subangular blocky structure; friable; extremely acid; gradual wavy boundary.

Oa2—18 to 48 inches; very dark brown (10YR 2/2) muck; about 22 percent fiber, unrubbed, 2 percent fiber, rubbed; weak coarse subangular blocky structure; friable; extremely acid; clear wavy boundary.

Oa3—48 to 80 inches; black (10YR 2/1) muck; about 2 percent fiber, unrubbed; massive; friable; very strongly acid.

The reaction ranges from extremely acid to strongly acid. The pH is less than 4.5 in 0.01 molar calcium chloride and ranges from 4.5 to 5.5 by field methods that approximate pH in 1:1 water. The mineral content within 16 to 51 inches of the surface ranges from about 5 to 25 percent and up to 75 percent below a depth of 51 inches.

The Oa horizon has hue of 5YR to 10YR, value of 2 or 3, and chroma of 1 or 2; or it is neutral and has value of 2 or less. The fiber content is less than 33 percent, unrubbed.

Some pedons have a Cg horizon within 80 inches of the surface, and this horizon has hue of 10YR to 5Y, value of 5 to 7, and chroma of 2 or less. The texture is sand or fine sand.

Immokalee Series

The Immokalee series consists of soils that are poorly drained. These soils formed in sandy marine sediment. They are on broad plains on the flatwoods. The slopes are less than 2 percent. Immokalee soils are sandy, siliceous, hyperthermic Arenic Haplaquods.

Immokalee soils are closely associated with Basinger, EauGallie, Myakka, Pomello, Smyrna, and St. Johns soils. Basinger soils do not have a spodic horizon. EauGallie soils have an argillic horizon below the spodic horizon. Myakka, Smyrna, and St. Johns soils have a spodic horizon within 30 inches of the surface. Pomello soils are moderately well drained.

Typical pedon of Immokalee fine sand, in an area of EauGallie and Immokalee fine sands; about 2.5 miles southeast of Chuluota, 750 feet west and 1,300 feet south of the northeast corner of sec. 35, T. 21 S., R. 32 E.

A—0 to 4 inches; dark gray (N 4/0) fine sand; dark organic matter mixed with light gray sand grains; weak fine granular structure; very friable; many fine and medium roots; very strongly acid; clear smooth boundary.

E1—4 to 7 inches; gray (N 6/0) fine sand; single grained; loose; common fine and medium roots; very strongly acid; gradual wavy boundary.

E2—7 to 42 inches; light gray (10YR 7/1) fine sand; single grained; loose; few fine and medium roots; very strongly acid; clear wavy boundary.

Bh—42 to 62 inches; black (10YR 2/1) fine sand; weak fine granular structure; friable; common fine and medium roots; very strongly acid; gradual wavy boundary.

BC—62 to 80 inches; dark yellowish brown (10YR 4/4) fine sand; single grained; loose; strongly acid.

Sand or fine sand extends to a depth of 80 inches or more. The reaction ranges from extremely acid to medium acid.

The A horizon has hue of 10YR or 2.5Y, value of 2 to 4, and chroma of 1 or 2; or it is neutral and has value of 2 to 4. The thickness of the A horizon is 3 to 12 inches; and if the value is less than 3, the thickness is less than 10 inches.

The E horizon has hue of 10YR, value of 5 to 8, and chroma of 1 or 2; or it is neutral and has value of 5 to 8. Some pedons have mottles in shades of gray, yellow, brown, or red. The combined thickness of the A and E horizons ranges from 30 to 50 inches.

The Bh horizon has hue of 5YR to 10YR, value of 2 or 3, and chroma of 1 or 2. In some pedons, vertical or horizontal intrusions or masses of dark gray to light gray sand are in this horizon. The thickness of the Bh horizon ranges from 12 to 28 inches.

A second sequa of E' and Bh' is in some pedons and the range in hue, value, and chroma is the same as those in the E and Bh horizons.

The BC horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 to 4.

Malabar Series

The Malabar series consists of soils that are poorly drained. These soils formed in sandy and loamy marine sediment. They are in sloughs or along poorly defined drainageways. The slopes are less than 2 percent. Malabar soils are loamy, siliceous, hyperthermic Grossarenic Ochraqualfs.

Malabar soils are closely associated with Basinger, Delray, EauGallie, Pineda, Smyrna, St. Johns, and Wabasso soils. Basinger, Smyrna, and St. Johns soils do not have an argillic horizon. Delray soils have a mollic epipedon. EauGallie and Wabasso soils have a spodic horizon. Pineda soils have an argillic horizon between depths of 20 and 40 inches.

Typical pedon of Malabar fine sand; about 3 miles east of Chuluota, 2,000 feet east and 1,000 feet north of the southwest corner of sec. 13, T. 21 S., R. 32 E.

A—0 to 6 inches; dark gray (10YR 4/1) fine sand; weak fine granular structure; friable; many fine and few medium roots; slightly acid; gradual wavy boundary.

E—6 to 10 inches; yellowish brown (10YR 5/4) fine sand; common medium faint strong brown (7.5YR 5/6) streaks along old root channels; single grained; loose; few fine and medium roots; brownish iron coatings on sand grains; slightly acid; gradual wavy boundary.

Bw1—10 to 20 inches; very pale brown (10YR 7/4) fine sand; common coarse distinct strong brown (7.5YR 5/8) mottles; weak fine granular structure; friable; few fine roots; many uncoated sand grains; iron coatings on sand grains; medium acid; clear wavy boundary.

Bw2—20 to 35 inches; yellow (10YR 7/6) fine sand; common medium faint brownish yellow (10YR 6/6) mottles; weak medium granular structure; friable; iron coatings on sand grains; medium acid; clear wavy boundary.

E'—35 to 48 inches; light gray (10YR 7/1) fine sand; single grained; loose; uncoated sand grains; slightly acid; abrupt wavy boundary.

Btg—48 to 70 inches; gray (5Y 5/1) fine sandy loam; few medium distinct dark yellowish brown (10YR 4/4) mottles; weak coarse subangular blocky structure; friable; sand grains coated and bridged with clay; neutral; gradual wavy boundary.

Cg—70 to 80 inches; greenish gray (5GY 5/1) loamy sand; massive; friable; few coarse pockets of gray (5YR 5/1) sandy clay loam; neutral.

The thickness of the solum ranges from 46 to 80 inches. The reaction ranges from strongly acid to moderately alkaline.

The A horizon has hue of 10YR or 2.5Y, value of 2 to 4, and chroma of 2 or less. The texture is fine sand. The thickness of the A horizon is 2 to 8 inches.

The E horizon has hue of 10YR or 2.5Y, value of 5 to 8, and chroma of 2 to 4. The texture is sand or fine sand. The thickness of the E horizon is 3 to 22 inches.

The Bw horizon has hue of 10YR, value of 5 to 7, and chroma of 4 to 8. The texture is sand or fine sand. The thickness of the Bw horizon is 10 to 28 inches.

The E' horizon has hue of 10YR, value of 5 to 7, and chroma of 1 to 3. The combined thickness of the A, E, Bw, and E' horizons is more than 40 inches.

The Btg horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 2 or less. The texture is sandy loam, fine sandy loam, or sandy clay loam. A transitional BCg horizon is in some pedons. The BCg horizon has the same range in texture, hue, value, and chroma as the Btg horizon.

The Cg horizon has hue of 10YR to 5GY, value of 5 to 7, and chroma of 2 or less. It is sand, fine sand, loamy fine sand, or loamy sand that has pockets or lenses of a loamy material.

Manatee Series

The Manatee series consists of soils that are very poorly drained. These soils formed in sandy and loamy marine sediment. They are on the flood plains and in depressions. The slopes are less than 2 percent. Manatee soils are coarse-loamy, siliceous, hyperthermic Typic Argiaquolls.

Manatee soils are closely associated with Felda, Floridana, Holopaw, and Nittaw soils. Felda and Holopaw soils do not have a mollic epipedon. Floridana soils have an argillic horizon that is more than 40 inches deep. Nittaw soils have a clayey argillic horizon.

Typical pedon of Manatee mucky fine sand, in an area of Felda and Manatee mucky fine sands, depressional; about 1 mile north of Midway, 2,100 feet west and 1,000 feet north of the southeast corner of sec. 29, T. 19 S., R. 31 E.

Ap—0 to 14 inches; black (10YR 2/1) mucky fine sand; moderate fine and medium granular structure; friable; many fine and medium roots; common light gray sand grains; neutral; gradual wavy boundary.

A—14 to 19 inches; very dark gray (10YR 3/1) loamy sand; weak fine granular structure; friable; many fine and medium roots; many light gray sand grains; neutral; gradual wavy boundary.

Btg1—19 to 33 inches; dark gray (10YR 4/1) sandy loam; few medium distinct light gray (10YR 7/1) mottles; weak coarse subangular blocky structure; friable; many fine and few medium roots; many sand grains coated and bridged with clay; mildly alkaline; clear wavy boundary.

Btg2—33 to 50 inches; dark gray (10YR 4/1) fine sandy loam; few fine distinct olive brown (2.5Y 4/4) mottles; weak coarse subangular blocky structure; friable; common fine and medium roots; many sand grains coated and bridged with clay; moderately alkaline; gradual wavy boundary.

Cg—50 to 80 inches; gray (5Y 6/1) loamy fine sand; common coarse distinct greenish gray (5G 5/1) mottles and bluish gray (5B 6/1) mottles; massive; slightly sticky, slightly plastic; common semihard calcium carbonate nodules; calcareous; moderately alkaline.

The thickness of the solum ranges from 30 to 60 inches. The reaction ranges from medium acid to mildly alkaline in the A horizon and from neutral to moderately alkaline in the B and C horizons.

The A horizon has hue of 10YR or 2.5Y, value of 2 or 3, and chroma of 2 or less. The texture is fine sand, loamy sand, or mucky fine sand. The thickness of the A horizon ranges from 10 to 20 inches.

The Btg horizon has hue of 10YR to 5Y, value of 3 to 7, and chroma of 1 or less. The texture is fine sandy loam, sandy loam, or loamy fine sand. In some pedons, a transitional BCkg horizon may occur.

The Cg horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 2 or less. In some pedons, this horizon has soft calcium carbonate accumulations or calcium carbonate nodules. The content of 2 to 20 millimeter shell fragments ranges from 0 to 25 percent. The texture ranges from fine sand to sandy loam or the gravelly analogs of those textures.

Millhopper Series

The Millhopper series consists of soils that are moderately well drained. These soils formed in sandy and loamy marine sediment. They are on ridges and hillsides on the uplands. The slopes range from 0 to 8 percent. Millhopper soils are loamy, siliceous, hyperthermic Grossarenic Paleudults.

Millhopper soils are closely associated with Adamsville, Apopka, Astatula, Sparr, and Tavares soils. Adamsville, Astatula, and Tavares soils do not have an argillic horizon. Apopka soils are well drained, and Sparr soils are somewhat poorly drained.

Typical pedon of Millhopper fine sand, in an area of Tavares-Millhopper fine sands, 0 to 5 percent slopes; about 3 miles east of Casselberry, 1,000 feet south and 1,000 feet east of the northwest corner of sec. 13, T. 21 S., R. 30 E.

A—0 to 7 inches; gray (10YR 5/1) fine sand; weak medium granular structure; very friable; many fine and medium roots; medium acid; clear wavy boundary.

E1—7 to 28 inches; very pale brown (10YR 7/4) fine sand; weak fine granular structure; very friable; few fine roots; slightly acid; clear wavy boundary.

E2—28 to 35 inches; pale brown (10YR 6/3) fine sand; single grained; loose; few fine roots; slightly acid; clear wavy boundary.

E3—35 to 45 inches; very pale brown (10YR 7/3) fine sand; few fine faint pale brown mottles; single grained; loose; few fine roots; medium acid; clear wavy boundary.

Bt—45 to 54 inches; very pale brown (10YR 7/4) sandy loam; common medium distinct gray (10YR 5/1) mottles; weak fine subangular blocky structure; very friable; sand grains coated and bridged with clay; medium acid; clear wavy boundary.

Btg—54 to 80 inches; light gray (10YR 7/2) sandy clay loam; common medium distinct very pale brown (10YR 7/4) mottles; weak medium subangular blocky structure; friable; thin discontinuous clay films on faces of peds; strongly acid.

The thickness of the solum is 80 or more inches. The reaction ranges from very strongly acid to slightly acid in the A and E horizons and from very strongly acid to medium acid in the B horizon.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 1 or 2. The thickness of the A horizon is 3 to 9 inches; and if the value is 3, the thickness is less than 6 inches. The texture is sand or fine sand.

The upper part of the E horizon has hue of 10YR, value of 5 to 7, and chroma of 3 to 8. The lower part has hue of 10YR, value of 6 to 8, and chroma of 2 to 4. The combined thickness of the A and E horizons is more than 40 inches. The texture of the E horizon is sand or fine sand.

The Bt horizon has hue of 10YR, value of 5 to 7, and chroma of 3 to 7. The texture is sandy loam or loamy sand. The Bt horizon extends to a depth of 50 to 72 inches.

The Btg horizon has hue of 10YR to 5Y, value of 5 to 7, and chroma of 1 or 2. Mottles are in shades of gray, yellow, and brown. The texture is sandy loam or sandy clay loam. In some pedons, the Btg horizon is underlain by a BCg horizon.

Myakka Series

The Myakka series consists of soils that are poorly drained. These soils formed in sandy marine sediment. They are on broad plains on the flatwoods. The slopes are less than 2 percent. Myakka soils are sandy, siliceous, hyperthermic Aeric Haplaquods.

Myakka soils are closely associated with Basinger, Delray, EauGallie, Immokalee, Pomello, Smyrna, St. Johns, and Wabasso soils. Basinger soils do not have a spodic horizon. Delray soils have a mollic epipedon. EauGallie and Wabasso soils have an argillic horizon below the spodic horizon. Immokalee and Pomello soils have a spodic horizon at a depth of 30 to 50 inches. In addition, Pomello soils are moderately well drained. Smyrna soils have a spodic horizon that is within 20 inches of the surface. St. Johns soils have an umbric epipedon.

Typical pedon of Myakka fine sand, in an area of Myakka and EauGallie fine sands; in the city of Sanford, 500 feet west and 500 feet south of the northeast corner of sec. 36, T. 19 S., R. 30 E.

A—0 to 5 inches; black (10YR 2/1) fine sand; weak fine granular structure; very friable; many fine and medium roots; strongly acid; clear smooth boundary.

E—5 to 28 inches; light gray (10YR 7/1) fine sand; single grained; loose; common fine and medium roots; strongly acid; abrupt wavy boundary.

Bh1—28 to 30 inches; black (10YR 2/l) fine sand; weak coarse subangular blocky structure; many fine and medium roots; sand grains coated with organic matter; few uncoated sand grains; very strongly acid; clear wavy boundary.

Bh2—30 to 45 inches; dark brown (10YR 3/3) fine sand; weak coarse subangular blocky structure; many fine and medium roots; sand grains coated with organic matter; very strongly acid; clear wavy boundary.

C—45 to 80 inches; brown (10YR 4/3) fine sand; single grained; loose; few fine roots; strongly acid.

The thickness of the solum is more than 40 inches. The reaction ranges from extremely acid to slightly acid. The texture is sand or fine sand.

The Ap horizon and the crushed color of the A horizon have hue of 10YR, value of 2 to 4, and chroma of 1 or 2. Uncrushed colors have a salt-and-pepper appearance. The thickness of the A or Ap horizon is 3 to 7 inches.

The E horizon has hue of 10YR, value of 4 to 8, and chroma of 1 or 2. In some pedons, this horizon has mottles in shades of gray, yellow, and brown. The combined thickness of the A and E horizons ranges from 20 to 30 inches.

The Bh horizon has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 to 3. In some pedons, this horizon has medium to coarse, vertical to horizontal tongues or pockets of gray, light brownish gray, or light gray sand; and in some pedons, a transitional Bh/BC horizon may occur. This horizon has the same range in color as the Bh horizon.

The C horizon has hue of 10YR, value of 4 to 7, and chroma of 1 to 4. Mottles in shades of brown, yellow, or gray are in some pedons.

Nittaw Series

The Nittaw series consists of soils that are very poorly drained. These soils formed in clayey marine sediment. They are on the flood plains and in depressions. The slopes are less than 2 percent. Nittaw soils are fine, montmorillonitic, hyperthermic Typic Argiaquolls.

Nittaw soils are closely associated with Basinger, Felda, Floridana, Holopaw, Manatee, and Okeelanta soils. Basinger soils do not have an argillic horizon. Felda and Holopaw soils do not have a mollic epipedon. In addition, Holopaw soils have an argillic horizon that is at a depth of more than 40 inches. Floridana soils have an argillic horizon that is at a depth of more than 20 to 40 inches. Manatee soils are in a coarse-loamy family and have siliceous mineralogy. Okeelanta soils formed in organic materials.

Typical pedon of Nittaw muck, in an area of Nittaw muck, occasionally flooded; about 2 miles southeast of Midway, 1,800 feet west and 1,600 feet south of the northeast corner of sec. 10, T. 20 S., R. 31 E.

Oa—0 to 2 inches; black (10YR 2/1) muck; 50 percent fiber, unrubbed, 7 percent fiber, rubbed; weak medium granular structure; friable; many fine and medium roots; few uncoated white (10YR 8/1) sand grains; about 10 percent mineral content; extremely acid; abrupt smooth boundary.

A—2 to 10 inches; black (10YR 2/1) mucky fine sand; weak medium granular structure; friable; many fine and medium roots; medium acid; clear smooth boundary.

Btg1—10 to 20 inches; very dark brown (10YR 2/2) sandy clay; moderate medium blocky structure; few fine roots; sand grains coated and bridged with clay; medium acid; gradual smooth boundary.

Btg2—20 to 60 inches; dark gray (10YR 4/1) sandy clay; few fine faint olive gray mottles; moderate medium blocky structure; very sticky, very plastic; sand grains coated and bridged with clay; neutral; clear smooth boundary.

Cg—60 to 80 inches; gray (10YR 5/1) sandy loam; massive; friable; neutral.

The thickness of the solum is 30 inches or more.

The Oa horizon has hue of 10YR, value of 2, and chroma of 1 or 2; or it is neutral and has value of 2 or 3. The thickness of the Oa horizon is 1 to 7 inches. The reaction is extremely acid. Some pedons do not have an Oa horizon.

The A horizon has hue of 10YR or 2.5Y, value of 2 or 3, and chroma of 1 or 2. The texture is sand, fine sand, mucky fine sand, fine sandy loam, sandy loam, or sandy clay loam. The thickness of the A horizon is 4 to 12 inches. The reaction is medium acid to neutral.

The upper part of the Btg horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. The lower part has hue of 10YR to 5Y, value of 4 to 6, and chroma of 1 or 2. Few or common, fine to coarse mottles of gray, brown, olive, and yellow are in this horizon. Some pedons have few, medium or coarse pockets of gray fine sand, loamy sand, or loamy fine sand in the lower part of the Btg horizon. Few to many, fine to coarse mottles and pockets of light gray to white carbonate materials may also occur in this horizon. The upper 20 inches of the Btg horizon contains between 35 and 58 percent clay, by weight. The reaction of the Btg horizon ranges from medium acid to moderately alkaline.

The Cg horizon has hue of 10YR to 5Y, value of 4 to 9, and chroma of 1 or 2. The texture ranges from sand to fine sandy loam. The reaction ranges from neutral to moderately alkaline.

Okeelanta Series

The Okeelanta series consists of organic soils that are moderately deep and very poorly drained. These soils formed in the remains of hydrophytic, nonwoody plants mixed with a small amount of mineral material. They are in large freshwater marshes and on the flood plains. The slopes are less than 2 percent. Okeelanta soils are sandy or sandy-skeletal, siliceous, euic, hyperthermic Terric Medisaprists.

Okeelanta soils are closely associated with Basinger, Felda, Floridana, Holopaw, Manatee, and Nittaw soils. The associated soils formed in mineral material.

Typical pedon of Okeelanta muck, in an area of Nittaw, Okeelanta, and Basinger soils, frequently flooded; about 4 miles west of Longwood, 100 feet east and 100 feet north of the southwest corner of sec. 27, T. 20 S., R. 29 E.

Oa—0 to 42 inches; black (N 2/0) muck; 65 percent fiber, unrubbed, 10 percent fiber, rubbed; weak fine and medium granular structure; very friable; many fine roots; about 10 percent mineral content; mildly alkaline; clear smooth boundary.

C1—42 to 60 inches; black (10YR 2/1) fine sand; single grained; loose; mildly alkaline; clear wavy boundary.

C2—60 to 80 inches; light gray (10YR 7/2) fine sand; single grained; loose; moderately alkaline.

The thickness of the organic material ranges from 16 to 50 inches. The reaction ranges from neutral to moderately alkaline. Mineral material texture is sand or fine sand.

The Oa horizon has hue of 7.5YR or 10YR, value of 2 to 4, and chroma of 1 or 2; or it is neutral and has value of 2. The content of fiber is commonly 5 to 33 percent, unrubbed, but the range of fiber content is up to 50 percent, unrubbed, and from 3 to 16 percent, rubbed. The content of mineral in this horizon ranges from about 10 to 40 percent.

The C horizon has hue of 10YR, value of 2 to 7, and chroma of 1 or 2. Shell fragments range from none to many. The percent, by volume, of shell fragments ranges from 0 to 15 percent.

Paola Series

The Paola series consists of soils that are excessively drained. These soils formed in sandy marine sediment. They are on ridges on the uplands. The slopes range from 0 to 5 percent. Paola soils are hyperthermic, uncoated Spodic Quartzipsamments.

Paola soils are closely associated with Astatula, St. Lucie, and Tavares soils. The associated soils do not have a B/E horizon. In addition, Tavares soils are moderately well drained.

Typical pedon of Paola sand, in an area of Paola-St. Lucie sands, 0 to 5 percent slopes; about 1 mile northwest of Oviedo, 2,500 feet east and 2,500 feet south of the northwest corner of sec. 4, T. 21 S., R. 31 E.

A—0 to 3 inches; dark gray (10YR 4/1) sand; single grained; loose; many small and large roots; very strongly acid; clear wavy boundary.

E—3 to 25 inches; light gray (10YR 7/1) sand; single grained; loose; common fine and medium roots; very strongly acid; clear wavy boundary.

B/E—25 to 47 inches; yellowish brown (10YR 5/6) sand; single grained; loose; few tongues filled with a light color sand from the E horizon; outer edges of the tongues stained with grayish brown (10YR 5/2) organic material, weakly cemented in places; few and common, coarse and fine soft spheroidal very dark gray (10YR 3/2) concretions; thin discontinuous layers of reddish brown (5YR 4/3) weakly cemented sand at irregular intervals at contact between the E and B horizons; few fine roots; very strongly acid; gradual wavy boundary.

C—47 to 80 inches; light yellowish brown (10YR 6/4) sand; single grained; loose; very strongly acid.

Depth of sand or fine sand is more than 80 inches. The reaction ranges from extremely acid to neutral. The content of silt plus clay in the control section is less than 5 percent.

The A horizon has hue of 10YR, value of 4 to 6, and chroma of 1 or 2; or it is neutral and has value of 4 to 6. The thickness of the A horizon is 2 to 5 inches.

The E horizon has hue of 10YR or 2.5Y, value of 5 to 8, and chroma of 1 or 2; or it is neutral and has value of 6 to 8. The combined thickness of the A and E horizons is 20 to 40 inches.

The B part of the B/E horizon has hue of 5YR to 10YR, value of 5 to 7, and chroma of 4 to 8. Some pedons do not have tongues filled with E material and, therefore, have only a B horizon. The E part of the B/E horizon has the same color range as the E horizon. In most pedons, the B/E horizon is weakly cemented Bh fragments that are a half inch to 2 inches thick. In some pedons, the E horizon is underlain by a thin discontinuous layer that has hue of 5YR to 10YR, value of 3 or 4, and chroma of 3 or 4. An EB horizon, 4 to 6 inches thick, is between the E and B/E horizons in areas that do not have the thin, discontinuous, stained layer. The thickness of the B/E horizon is 12 to 35 inches.

The C horizon has hue of 10YR, value of 5 to 8, and chroma of 1 to 8.

Pineda Series

The Pineda series consists of soils that are poorly drained. These soils formed in sandy and loamy marine sediment. They are in sloughs and along the edges of broad depressions. The slopes are less than 2 percent. Pineda soils are loamy, siliceous, hyperthermic Arenic Glossaqualfs.

Pineda soils are closely associated with EauGallie, Felda, Floridana, Holopaw, Malabar, and Nittaw soils. EauGallie soils have a spodic horizon. Felda soils do not have tongues of albic material in the argillic horizon. Floridana soils have a mollic epipedon. Holopaw and Malabar soils have an argillic horizon that is at a depth of more than 40 inches. Nittaw soils have a mollic epipedon and an argillic horizon that is within 20 inches of the surface.

Typical pedon of Pineda fine sand; 3 miles northeast of Sanford, 2,200 feet east and 1,000 feet south of the northwest corner of sec. 21, T. 19 S., R. 30 E.

A—0 to 2 inches; black (10YR 2/1) fine sand; moderate medium granular structure; very friable; many fine and medium roots; medium acid; clear smooth boundary.

E—2 to 18 inches; light gray (10YR 7/2) fine sand; single grained; loose; few coarse roots; medium acid; gradual wavy boundary.

Bw—18 to 26 inches; pale brown (10YR 6/3) fine sand; loose; sand grains coated with iron; slightly acid; gradual wavy boundary.

Btg/E—26 to 68 inches; dark gray (10YR 4/1) sandy loam; common coarse prominent dark greenish gray (5GY 4/1) mottles; weak medium subangular blocky structure; friable; common medium distinct dark grayish brown (10YR 4/2) sandy tongues in upper part; neutral; clear smooth boundary.

Cg—68 to 80 inches; greenish gray (5GY 5/1)loamy sand; weak medium subangular blocky structure; friable; about 10 percent shell fragments, by volume; neutral.

The thickness of the solum is 40 to 80 inches. The reaction ranges from very strongly acid to neutral in the A, E, and Bw horizons, from strongly acid to moderately alkaline in the Btg horizon, and from medium acid to moderately alkaline in the Cg horizon. The texture is sand or fine sand.

The A horizon has hue of 10YR, value of 2 to 5, and chroma of 1 or 2. The thickness of this horizon is 1 to 7 inches.

The E horizon has hue of 10YR, value of 5 to 8, and chroma of 1 to 3. The thickness of this horizon is 6 to 20 inches.

The Bw horizon has hue of 7.5YR or 10YR, value of 4 to 8, and chroma of 3 to 8. The combined thickness of the A, E, and Bw horizons is 20 to 40 inches.

The Btg/E horizon has hue of 10YR to 5GY, value of 4 to 7, and chroma of 1 or 2. In some pedons, this horizon has mottles in shades of brown. The texture of the Btg part of the Btg/E horizon is sandy loam or fine sandy loam. The content of clay averages between 15 and 25 percent. Tongues of sand or fine sand albic material extend into the upper part of this horizon. The E part of the Btg/E horizon has colors similar to those of the E horizon. Some pedons have a Btg horizon that has colors similar to those of the Btg part of the Btg/E horizon. The Btg/E horizon extends to a depth of 50 to 70 inches.

The Cg horizon has hue of 10YR to 5GY, value of 5 to 8, and chroma of 1 or 2. The texture is fine sand, sandy loam, or loamy sand.

Pomello Series

The Pomello series consists of soils that are moderately well drained. These soils formed in sandy marine sediment. They are on ridges on the flatwoods. The slopes range from 0 to 5 percent. Pomello soils are sandy, siliceous, hyperthermic Arenic Haplohumods.

Pomello soils are closely associated with EauGallie, Immokalee, Millhopper, Myakka, St. Lucie, and Tavares soils. EauGallie and Millhopper soils have an argillic horizon. Immokalee soils are poorly drained. Myakka soils have a spodic horizon that is within 30 inches of the surface. St. Lucie and Tavares soils do not have a spodic horizon.

Typical pedon of Pomello fine sand, 0 to 5 percent slopes; about 1.5 miles northwest of Snow Hill, 700 feet east and 2,500 feet south of the northwest corner of sec. 28, T. 20 S., R. 32 E.

A—0 to 2 inches; light gray (10YR 6/1) fine sand; weak fine granular structure; very friable; many fine and medium roots; very strongly acid; clear wavy boundary.

E—2 to 31 inches; white (10YR 8/1) fine sand; common faint dark gray (10YR 4/1) streaks; single grained; loose; common fine and medium roots; very strongly acid; abrupt wavy boundary.

Bh1—31 to 33 inches; black (10YR 2/1) fine sand; extremely firm; massive in place; parting to weak fine granular structure; friable; common fine and medium roots; sand grains coated with organic matter; very strongly acid; clear wavy boundary.

Bh2—33 to 40 inches; dark brown (7.5YR 3/2) fine sand; massive, parting to weak fine granular structure; friable; few medium roots; sand grains coated with organic matter; very strongly acid; clear wavy boundary.

BC—40 to 50 inches; brown (10YR 5/3) fine sand; single grained; loose; very strongly acid; clear wavy boundary.

C—50 to 80 inches; very pale brown (10YR 7/4) fine sand; single grained; very strongly acid.

The reaction ranges from very strongly acid to medium acid. The texture is sand or fine sand.

The A horizon has hue of 10YR, value of 4 to 7, and chroma of 1 or 2. The thickness of this horizon is 1 to 6 inches.

The E horizon has hue of 10YR or 2.5Y, value of 7 or 8, and chroma of 2 or less. In some pedons, this horizon has streaks in shades of gray and brown. The combined thickness of the A and E horizons ranges from 30 to 50 inches.

The Bh horizon has hue of 10YR to 5YR, value of 3 or less, and chroma of 3 or less. The thickness of the Bh horizon is 6 to 16 inches.

The transitional BC horizon and the C horizon have hue of 10YR, value of 5 to 7, and chroma of 1 to 4. Some pedons do not have a BC and C horizon.

Pompano Series

The Pompano series consists of soils that are poorly drained. These soils formed in sandy marine sediment. They are on the flood plains. The slopes are less than 2 percent. Pompano soils are siliceous, hyperthermic Typic Psammaquents.

Pompano soils are closely associated with Adamsville, Basinger, and Nittaw soils. Adamsville soils are somewhat poorly drained. Basinger soils have a Bh/E horizon. Nittaw soils have an argillic horizon.

Typical pedon of Pompano fine sand, occasionally flooded; about 2 miles southeast of Oviedo, 2,000 feet west and 50 feet south of the northeast corner of sec. 24, T. 21 S., R. 31 E.

A—0 to 4 inches; gray (10YR 5/1) fine sand; weak fine granular structure; very friable; many fine roots; medium acid; gradual smooth boundary.

C1—4 to 15 inches; pale brown (10YR 6/3) fine sand; single grained; loose; many fine roots; slightly acid; gradual wavy boundary.

C2—15 to 17 inches; light gray (10YR 6/1) fine sand; many medium distinct brownish yellow (10YR 6/6) mottles; single grained; loose; few fine roots; many clean sand grains; slightly acid; gradual wavy boundary.

C3—17 to 80 inches; light gray (10YR 7/2) fine sand; single grained; loose; slightly acid.

The reaction ranges from very strongly acid to mildly alkaline. The texture is sand or fine sand. The content of silt plus clay in the control section is about 1 to 10 percent.

The A horizon has hue of 10YR or 2.5Y, value of 2 to 5, and chroma of 1 or 2. The thickness of this horizon is 2 to 6 inches.

The C horizon has hue of 10YR to 5Y, value of 5 to 8, and chroma of 1 to 3. This horizon has mottles in shades of brown and yellow that range from none to many.

Samsula Series

The Samsula series consists of soils that are very poorly drained. These soils formed in hydrophytic, nonwoody plant remains. They are in depressions and freshwater swamps. The slopes are less than 2 percent. Samsula soils are sandy or sandy-skeletal, siliceous, dysic, hyperthermic Terric Medisaprists.

Samsula soils are closely associated with Basinger, Brighton, Hontoon, and Sanibel soils. Basinger and Sanibel soils formed in mineral material. Brighton and Hontoon soils formed in organic material that is more than 50 inches thick.

Typical pedon of Samsula muck, in an area of Brighton, Samsula, and Sanibel mucks; about 5 miles west of Lake Mary, 2,000 feet north and 500 feet west of the southeast corner of sec. 11, T. 20 S., R. 29 E.

Oa1—0 to 18 inches; dark reddish brown (5YR 2.5/2) muck; about 20 percent fiber content, unrubbed, 5 percent fiber, rubbed; moderate medium granular structure; friable; many fine roots; about 10 percent mineral material; extremely acid; gradual smooth boundary.

Oa2—18 to 26 inches; black (5YR 2.5/1) muck; about 15 percent fiber, unrubbed, 5 percent fiber, rubbed; moderate medium granular structure; friable; common fine roots; about 20 percent mineral material; extremely acid; abrupt wavy boundary.

A—26 to 30 inches; very dark gray (10YR 3/1) mucky fine sand; single grained; loose; extremely acid; clear wavy boundary.

C—30 to 80 inches; grayish brown (10YR 5/2) fine sand; common medium faint brown (10YR 5/3) mottles; single grained; loose; extremely acid.

The thickness of the organic material ranges from 16 to 50 inches. The reaction in the organic material is extremely acid and is extremely acid to medium acid in the mineral material.

The Oa horizon has hue of 5YR to 10YR, value of 1 or 2, and chroma of 1 or 2; or it is neutral and has value of 2. The content of fiber in the control section is less than 33 percent, unrubbed, or it is less than 16 percent, by volume, rubbed.

The A horizon has hue of 10YR, value of 2 to 4, and chroma of 1 or 2; or it is neutral and has value of less than 2. The texture is fine sand or mucky fine sand. The thickness of the A horizon is 3 to 20 inches.

The C horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2. In some pedons, this horizon has mottles of lighter or darker colors. The texture is sand, fine sand, or loamy sand. The C horizon extends to a depth of 80 inches or more.

Sanibel Series

The Sanibel series consists of soils that are very poorly drained. These soils formed in sandy marine sediment. They are in depressions. The slopes are less than 2 percent. Sanibel soils are sandy, siliceous, hyperthermic Histic Humaquepts.

Sanibel soils are closely associated with Basinger, Brighton, Hontoon, Holopaw, and Samsula soils. Basinger and Holopaw soils do not have a histic epipedon. Brighton, Hontoon, and Samsula soils formed in organic material.

Typical pedon of Sanibel muck, in an area of Brighton, Samsula, and Sanibel mucks; about 2 miles northeast of Markham; 25 feet east and 100 feet north of the southwest corner of sec. 25, T. 19 S., R. 29 E.

Oa—0 to 6 inches; black (N 2/0) muck; 25 percent fiber, unrubbed, 5 percent fiber, rubbed; weak medium granular structure; friable; many fine and medium roots; about 55 percent mineral material; strongly acid; gradual wavy boundary.

A—6 to 8 inches; black (10YR 2/1) mucky fine sand; weak medium granular structure; very friable; few fine roots; medium acid; gradual wavy boundary.

C1—8 to 28 inches; dark grayish brown (10YR 4/2) fine sand; single grained; loose; few fine roots; medium acid; gradual wavy boundary.

C2—28 to 80 inches; light gray (10YR 7/2) fine sand; common medium distinct brown (10YR 4/3) mottles; single grained; loose; medium acid.

Sand or fine sand extends to 80 inches or more. The reaction ranges from extremely acid to neutral.

The O horizon has hue of 5YR to 10YR, value of 2 or 3, and chroma of 1 or 2; or it is neutral and has value of 2 or 3. It is hemic or sapric organic material. The thickness of the O horizon is 4 to 8 inches.

The A horizon has hue of 10YR, value of 2 to 5, and chroma of 1 or 2. The texture is fine sand or mucky fine sand. The thickness of the A horizon is 2 to 6 inches.

The C horizon has hue of 10YR, value of 4 to 8, and chroma of 1 or 2. In some pedons, the C horizon has mottles in shades of gray, yellow, or brown. This horizon extends to a depth of more than 80 inches.

Seffner Series

The Seffner series consists of soils that are somewhat poorly drained. These soils formed in sandy marine sediment. They are on knolls and ridges on the flatwoods and on lower hillsides on the uplands. The slopes are less than 2 percent. Seffner soils are sandy, siliceous, hyperthermic Quartzipsammentic Haplumbrepts.

Seffner soils are closely associated with Adamsville, Astatula, Pomello, Sparr, and Tavares soils. The associated soils do not have an umbric epipedon. In addition, Astatula soils are excessively drained, and Tavares soils are moderately well drained. Pomello soils have a spodic horizon. Sparr soils have an argillic horizon.

Typical pedon of Seffner fine sand; about 3.5 miles southeast of Chuluota, 1,000 feet west and 1,800 feet south of the northeast corner of sec. 36, T. 21 S., R. 32 E.

A—0 to 15 inches; very dark gray (10YR 3/1) fine sand; weak fine granular structure; very friable; few very fine roots; strongly acid; abrupt smooth boundary.

C1—15 to 22 inches; very pale brown (10YR 7/3) fine sand; single grained; loose; strongly acid; gradual wavy boundary.

C2—22 to 45 inches; light gray (10YR 7/2) fine sand; common medium distinct yellowish brown (10YR 5/4) mottles; single grained; loose; strongly acid; clear irregular boundary.

C3—45 to 80 inches; white (10YR 8/1) fine sand; common medium distinct yellowish brown (10YR 5/4) mottles; single grained; loose; strongly acid.

Fine sand or sand extends to a depth of 80 inches or more. The reaction ranges from very strongly acid to neutral.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 to 3. The thickness of this horizon is 10 to 23 inches. In some pedons, a transitional AC horizon may occur.

The C horizon has hue of 10YR, value of 5 to 8, and chroma of 1 to 3. Mottles range from few to many and fine to medium. The C horizon extends to a depth of more than 80 inches.

Smyrna Series

The Smyrna series consists of soils that are very poorly drained. These soils formed in sandy marine sediment. They are in depressions. The slopes are less than 2 percent. Smyrna soils are sandy, siliceous, hyperthermic Aeric Haplaquods.

Smyrna soils are closely associated with Basinger, EauGallie, Immokalee, Myakka, and St. Johns soils. Basinger soils do not have a continuous spodic horizon. EauGallie soils have an argillic horizon. Immokalee soils have a spodic horizon that is within 30 to 50 inches of the surface, and Myakka soils have a spodic horizon that is within 20 to 30 inches of the surface. St. Johns soils have an umbric epipedon.

Typical pedon of Smyrna fine sand, in an area of Basinger and Smyrna fine sands, depressional; about 6.5 miles east of Chuluota, 400 feet north and 2,000 feet east of the southwest corner of sec. 28, T. 21 S., R. 33 E.

A—0 to 2 inches; black (10YR 2/1) crushed fine sand; weak coarse granular structure; very friable; many fine roots; strongly acid; clear wavy boundary.

E—2 to 15 inches; light gray (10YR 7/1) fine sand; single grained; loose; few fine roots; strongly acid; abrupt wavy boundary.

Bh1—15 to 17 inches; very dark grayish brown (10YR 3/2) fine sand; massive in place, parting to moderate medium granular structure; extremely firm; many fine and medium roots; sand grains coated with organic matter; few medium distinct dark gray vertical uncoated sand streaks; very strongly acid; gradual wavy boundary.

Bh2—17 to 25 inches; dark brown (7.5YR 3/2) fine sand; common medium distinct black (10YR 2/1) mottles; massive in place, parting to moderate medium granular structure; extremely firm; few medium decaying roots; very strongly acid; clear wavy boundary.

Cl—25 to 40 inches; light yellowish brown (10YR 6/4) fine sand; many coarse distinct dark brown (7.5YR 4/4) mottles; single grained; loose; strongly acid; clear wavy boundary.

C2—40 to 65 inches; light gray (10YR 7/1) fine sand; single grained; loose; strongly acid; gradual wavy boundary.

C3—65 to 80 inches; gray (10YR 6/1) fine sand; few fine distinct yellowish brown (10YR 5/6) streaks; single grained; loose; strongly acid.

The thickness of the solum is less than 40 inches. The reaction is medium acid to extremely acid.

Crushed color of the A horizon has hue of 10YR, value of 2 to 4, and chroma of 1 or 2; or it is neutral and has value of 4 or less. Uncrushed colors have a salt-and-pepper appearance. The thickness of the A horizon is 2 to 8 inches.

The E horizon has hue of 10YR, value of 5 to 8, and chroma of 1 or 2. Mottles in shades of gray, yellow, and brown range from none to many. The combined thickness of the A and E horizons is less than 20 inches.

The Bh horizon has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 or 2; or it is neutral and has value of 1 or 2. Sand grains in this horizon are coated with organic matter. In some pedons, a transitional BC/Bh horizon may occur.

The C horizon has hue of 10YR, value of 4 to 7, and chroma of 1 to 4. In some pedons, this horizon has mottles in shades of gray, yellow, or brown. The C horizon extends to a depth of more than 80 inches.

Sparr Series

The Sparr series consists of soils that are somewhat poorly drained. These soils formed in sandy and loamy marine sediment. They are on the lower slopes on the uplands and on low knolls on the flatwoods. The slopes are less than 2 percent. Sparr soils are loamy, siliceous, hyperthermic Grossarenic Paleudults.

Sparr soils are closely associated with Adamsville, Apopka, Astatula, Millhopper, Seffner, and Tavares soils. Adamsville, Astatula, Seffner, and Tavares soils do not have an argillic horizon. Apopka and Millhopper soils are in higher positions on the landscape than Sparr soils and are better drained.

Typical pedon of Sparr fine sand, in an area of Adamsville-Sparr fine sands; about 2.5 miles west of New Upsula, 1,000 feet west and 10 feet north of the southeast corner of sec. 30, T. 19 S., R. 30 E.

Ap—0 to 4 inches; very dark grayish brown (10YR 3/2) fine sand; moderate medium granular structure; very friable; many fine and medium roots; very strongly acid; clear wavy boundary.

E1—4 to 15 inches; grayish brown (10YR 5/2) fine sand; single grained; very friable; many fine and medium roots; strongly acid; clear wavy boundary.

E2—15 to 26 inches; pale brown (10YR 6/3) fine sand; few fine distinct yellow (10YR 7/6) mottles; single grained; loose; common fine roots; many uncoated sand grains; strongly acid; clear wavy boundary.

EB—26 to 41 inches; light yellowish brown (10YR 6/4) fine sand; few fine and medium faint yellowish brown (10YR 5/4) mottles; single grained; loose; few fine roots; strongly acid; clear wavy boundary.

Bt—41 to 43 inches; very pale brown (10YR 7/3) sandy loam; common medium distinct dark yellowish brown (10YR 4/6) mottles; weak medium subangular blocky structure; friable; few roots; clay bridging between sand grains; very strongly acid; clear wavy boundary.

Btg—43 to 72 inches; light gray (10YR 7/2) fine sandy loam; many medium and coarse distinct yellow (10YR 7/6) mottles; moderate medium subangular blocky structure; friable; few clay films on faces of peds; strongly acid; clear wavy boundary.

BCg—72 to 80 inches; gray (N 5/0) sandy loam; weak medium subangular blocky structure; friable; very strongly acid.

The thickness of the solum is 60 or more inches. The reaction ranges from extremely acid to slightly acid.

The A horizon has hue of 10YR or 2.5Y, value of 2 to 5, and chroma of 1 or 2. The texture is sand or fine sand. The thickness of the A horizon is 3 to 8 inches.

The E horizon has hue of 10YR or 2.5Y, value of 4 to 8, and chroma of 1 to 4. In some pedons, the EB horizon has hue of 10YR, value of 5 or 6, and chroma of

4 to 8. Mottles in shades of gray, brown, and yellow range from none to common. The combined thickness of the A, E, and EB horizons is more than 40 inches.

The Bt horizon has hue of 10YR, value of 5 to 7, and chroma of 3 to 6 and has mottles in shades of brown, gray, yellow, or red. The texture ranges from sandy loam to sandy clay loam. The thickness of the Bt horizon is 2 to 10 inches. Some pedons do not have a Bt horizon.

The Btg horizon has hue of 10YR to 5Y, value of 5 to 7, and chroma of 1 or 2. Mottles in shades of gray, yellow, brown, and red range from none to many. The texture ranges from sandy loam to sandy clay loam.

The BCg horizon has hue of 10YR to 5Y, value of 5 to 7, and chroma of 1 or 2; or it is neutral and has value of 5 to 7. The texture is sandy loam or fine sandy loam.

St. Johns Series

The St. Johns series consists of soils that are poorly drained. These soils formed in sandy marine sediment. They are on broad plains on the flatwoods. The slopes are less than 2 percent. St. Johns soils are sandy, siliceous, hyperthermic Typic Haplaquods.

St. Johns soils are closely associated with EauGallie, Felda, Immokalee, Myakka, and Smyrna soils. EauGallie and Felda soils have an argillic horizon. Immokalee soils have a spodic horizon that is within 30 to 50 inches of the surface. Myakka and Smyrna soils do not have an umbric epipedon.

Typical pedon of St. Johns fine sand, in an area of St. Johns and EauGallie fine sands; about 0.5 mile south of Henry Levy Park, 1,500 feet south and 10 feet west of the northeast corner of sec. 6, T. 20 S., R. 32 E.

A—0 to 12 inches; black (10YR 2/1) fine sand; weak fine granular structure; friable; many light gray (10YR 7/1) sand grains; many fine and medium roots; very strongly acid; gradual smooth boundary.

E—12 to 22 inches; gray (10YR 5/1) fine sand; single grained; loose; few fine and medium roots; very strongly acid; clear wavy boundary.

Bh1—22 to 32 inches; black (10YR 2/1) fine sand; massive; firm; common medium and fine roots; sand grains coated with organic matter; very strongly acid; clear wavy boundary.

Bh2—32 to 54 inches; very dark gray (5YR 3/1) fine sand; massive; friable; few fine roots; very strongly acid; gradual wavy boundary.

C—54 to 80 inches; grayish brown (10YR 5/2) fine sand; single grained; loose; very strongly acid.

The thickness of the solum ranges from 40 to 65 inches. The reaction ranges from extremely acid to strongly acid. The texture is sand or fine sand.

The A horizon has a hue of 10YR, value of 2 or 3, and chroma of 1 or 2. This horizon is 10 to 20 inches thick.

The E horizon has a hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 or 2. The combined thickness of the A and E horizons ranges from 12 to 30 inches.

The Bh horizon has hue of 10YR to 5YR, value of 2 or 3, and chroma of 1 to 3. In some pedons, the Bh horizon has tongues or masses of gray or light gray fine sand. The thickness of the Bh horizon is more than 15 inches. A transitional BC horizon is in some pedons.

The C horizon has hue of 10YR, value of 4 to 7, and chroma of 1 to 3.

In some pedons, a bisequem E' and Bh' may occur. These horizons have color ranges the same as the E and Bh horizons, respectively.

St. Lucie Series

The St. Lucie series consists of soils that are excessively drained. These soils formed in sandy marine sediment. They are on upland ridges. The slopes range from 0 to 5 percent. St. Lucie soils are hyperthermic, uncoated Typic Quartzipsamments.

St. Lucie soils are closely associated with Astatula, Paola, and Tavares soils. Astatula soils have matrix colors of chroma of 3 or higher in the C horizon. Paola soils have a B/E horizon. Tavares soils are moderately well drained.

Typical pedon of St. Lucie sand, in an area of Paola-St. Lucie sands, 0 to 5 percent slopes; about 2 miles south of Sanford, 1,300 feet west and 1,000 feet east of the northwest corner of sec. 12, T. 20 S., R. 30 E.

A—0 to 2 inches; dark gray (10YR 4/1) sand; single grained; loose; few coarse roots; strongly acid; clear smooth boundary.

C1—2 to 60 inches; light gray (10YR 7/1) sand; single grained; loose; few fine roots; uncoated sand grains; strongly acid; gradual wavy boundary.

C2—60 to 80 inches; white (10YR 8/1) sand; single grained; loose; uncoated sand grains; strongly acid.

Sand or fine sand extends to a depth of more than 80 inches. A diagnostic subsurface horizon is not within 7 feet of the surface. The reaction is extremely acid to neutral. The content of silt plus clay is less than 5 percent.

If undisturbed, the A horizon is a mixture of organic matter and sand. This horizon has hue of 10YR, value of 4 to 8, and chroma of 1 or 2. The thickness of the A horizon is 1 to 4 inches.

The C horizon has hue of 10YR, value of 6 to 8, and chroma of 1 or 2.

Tavares Series

The Tavares series consists of soils that are moderately well drained. These soils formed in sandy marine sediment. They are on nearly level to sloping hillsides on the uplands. The slopes range from 0 to 8 percent. Tavares soils are hyperthermic, uncoated Typic Quartzipsamments.

Tavares soils are closely associated with Adamsville, Apopka, Astatula, Millhopper, and Sparr soils. Adamsville soils are in lower positions on the landscape than Tavares soils and are somewhat poorly drained. Apopka, Millhopper, and Sparr soils have an argillic horizon. Astatula soils are in higher positions on the landscape and are excessively drained.

Typical pedon of Tavares fine sand, in an area of Tavares-Millhopper fine sands, 0 to 5 percent slopes; about 3 miles east of Casselberry, 1,200 feet east and 1,200 feet south of the northwest corner of sec. 13, T. 21 S., R. 30 E.

Ap—0 to 6 inches; very dark grayish brown (10YR 3/2) fine sand; weak fine granular structure; friable; many fine and medium roots; common uncoated light gray sand grains; strongly acid; abrupt wavy boundary.

C1—6 to 19 inches; yellowish brown (10YR 5/4) fine sand; single grained; loose; common fine roots; many uncoated sand grains; strongly acid; gradual wavy boundary.

C2—19 to 30 inches; light yellowish brown (10YR 6/4) fine sand; single grained; loose; few fine roots; many uncoated sand grains; strongly acid; gradual wavy boundary.

C3—30 to 35 inches; very pale brown (10YR 7/4) fine sand; common fine distinct strong brown (7.5YR 5/8) mottles and common fine faint white (10YR 8/1) mottles; single grained; loose; many uncoated sand grains; strongly acid; clear wavy boundary.

C4—35 to 80 inches; white (10YR 8/1) fine sand; few fine distinct brownish yellow (10YR 6/6) mottles; single grained; loose; many uncoated sand grains; strongly acid.

The reaction ranges from extremely acid to medium acid. The texture is sand or fine sand to a depth of more than 80 inches. The content of silt plus clay in the control section is 5 percent or less.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 1 or 2. The thickness of this horizon is 3 to 9 inches.

The upper part of the C horizon has hue of 10YR, value of 6 to 8, and chroma of 3 to 6. The lower part has hue of 10YR, value of 6 to 8, and chroma of 1 to 4. In some pedons, the lower part of the C horizon has mottles in shades of brown, yellow, or red. Mottles with chroma of 2 or less are within of 40 inches of the surface in most pedons. These are colors of uncoated sand grains and are not indicative of wetness. The C horizon extends to a depth of 80 inches or more.

Terra Ceia Series

The Terra Ceia series consists of organic soils that are deep and very poorly drained. These soils formed in the remains of hydrophytic, nonwoody plants. They are are on the flood plains and in freshwater marshes and depressions. The slopes are less than 2 percent. Terra Ceia soils are euic, hyperthermic Typic Medisaprists.

Terra Ceia soils are closely associated with Brighton, Canova, Nittaw, and Okeelanta soils. Brighton and Okeelanta soils are similar to Terra Ceia soils, but the organic material in Brighton soils is less decomposed than that in the Terra Ceia soils. Okeelanta soils have an organic surface layer 16 to 51 inches thick. Canova and Nittaw soils are made up of mainly mineral material.

Typical pedon of Terra Ceia muck, in an area of Terra Ceia muck, frequently flooded; about 3.5 miles east of Midway, 2,300 feet west and 500 feet north of the southeast corner of sec. 1, T. 20 S., R. 31 E.

Oa—0 to 80 inches; very dark gray (10YR 3/1) muck; fracture faces resemble weak medium subangular blocky structure; friable; about 30 percent fiber, unrubbed, 10 percent fiber, rubbed; about 30 percent mineral material; slightly acid.

The thickness of the organic material is more than 51 inches. The reaction is 4.5 or more in 0.01 molar calcium chloride or medium acid to moderately alkaline by field methods that approximate pH in 1:1 water.

An Oap horizon generally occurs when this soil is cultivated. The texture and color are similar to that of the Oa horizon.

The Oa horizon has hue of 5YR to 10YR, value of 2 or 3, and chroma of 1 or 2; or it is neutral and has value of 2. The content of fiber in the Oap and Oa horizons ranges from 2 to 16 percent, rubbed. Fibers are typically those of nonwoody plants; but, in some pedons, fibers of woody plants occur and range from about 5 to 30 percent, unrubbed. The content of mineral material in this horizon between depths of 16 and 51 inches ranges from about 5 to 40 percent. In some pedons, the underlying mineral material is fine sand or sand.

Wabasso Series

The Wabasso series consists of soils that are poorly drained. These soils formed in sandy and loamy marine sediment. They are on broad plains on the flatwoods. The slopes are less than 2 percent. Wabasso soils are sandy, siliceous, hyperthermic Alfic Haplaquods.

Wabasso soils are closely associated with EauGallie, Immokalee, Myakka, Pineda, Smyrna, and St. Johns soils. EauGallie soils have an argillic horizon at a depth of more than 40 inches. Immokalee, Myakka, Smyrna, and St. Johns soils do not have an argillic horizon. Pineda soils do not have a spodic horizon.

Typical pedon of Wabasso fine sand; in Henry Levy Park, 1,700 feet west and 500 feet north of the southeast corner of sec. 32, T. 19 S., R. 32 E.

A—0 to 6 inches; very dark gray (10YR 3/1) fine sand; weak fine granular structure; very friable; many fine and medium roots; very strongly acid; clear smooth boundary.

E—6 to 18 inches; grayish brown (10YR 5/2) fine sand; single grained; loose; common fine and medium roots; strongly acid; abrupt wavy boundary.

Bh—18 to 25 inches; dark reddish brown (5YR 3/3)fine sand; massive; friable; common fine and medium roots; gray streaks along root channels; strongly acid; gradual smooth boundary.

E'—25 to 27 inches; light brownish gray (10YR 6/2) fine sand; few fine distinct yellow (10YR 7/6) mottles; single grained; loose; common fine and medium roots; neutral; clear wavy boundary.

Btg—27 to 70 inches; gray (N 5/0) sandy clay loam; common medium distinct brown (7.5YR 4/4) mottles; weak coarse subangular blocky structure; firm; few fine and medium roots; few patchy clay films in root channels; sand grains coated with clay; neutral; gradual wavy boundary.

Cg—70 to 80 inches; light gray (10YR 7/1) loamy sand; massive; friable; few fine and medium roots; mildly alkaline.

The thickness of the solum is 50 to 75 inches.

The A horizon has hue of 10YR, value of 2 to 4, and chroma of 1 or 2. The thickness of the A horizon is 4 to l0 inches. The texture is sand or fine sand. The reaction ranges from very strongly acid to slightly acid. If the value is 2 or 3 and the chroma is 2 or less, the A horizon is less than 8 inches thick.

The E horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 or 2. The texture is sand or fine sand. The reaction ranges from very strongly acid to slightly acid. The combined thickness of the A and E horizons is 10 to 20 inches.

The Bh horizon has hue of 5YR to 10YR, value of 2 or 3, and chroma of 3 or less. The texture is sand, fine sand, or loamy sand. The reaction ranges from very strongly acid to neutral. The thickness of this horizon is 4 to 12 inches.

The E' horizon has hue of 10YR, value of 5 to 7, and chroma of 1 to 3. The texture is sand or fine sand. The reaction ranges from strongly acid to moderately alkaline. The combined thickness of the A, E, Bh, and E' horizons is 18 to 40 inches. Some pedons do not have an E' horizon.

The Btg horizon has hue of 10YR to 5Y, value of 5 to 7, and chroma of 1 or 2; or it is neutral and has value of 5 or 6. In some pedons, this horizon has mottles in shades of brown and yellow. The texture is sandy loam, fine sandy loam, or sandy clay loam. The reaction ranges from strongly acid to moderately alkaline.

The Cg horizon has hue of 10YR to 5Y, value of 6 to 8, and chroma of 1 or 2. The texture is sand, fine sand, or loamy sand. The reaction is mildly alkaline or moderately alkaline. Some pedons do not have a Cg horizon.

Formation of the Soils

In this section, the factors of soil formation are discussed and related to the soils in the county, and the processes of horizon differentiation are also explained.

Factors of Soil Formation

Soil is formed by weathering and other processes that act on the parent material. The characteristics of the soil are determined by five major factors of soil formation—parent material, climate, plants and animals, relief, and time.

Climate and plants and animals are the active forces of soil formation. They act on the parent material that has accumulated through the weathering of rocks and slowly change it into soil. The relative importance of the five major factors differs from place to place. In extreme cases, one factor can dominate in the formation of a soil and fix most of its properties. In general, it is the combined action of these factors that determines the present character of each soil.

Parent Material

Parent material is the unconsolidated mass from which a soil is formed. It determines the limits of the chemical and mineralogical composition of the soil. The soils in Seminole County formed in materials of late Miocene, Pleistocene, and Holocene geological ages *(3, 18)*. Approximately 55 percent of the soils in the county formed in deep to moderately deep sands underlain by clays of the Orlando Ridge, Osceda Plain, and Geneva Hill physiographic regions (see fig. 1). These regions are at the higher elevations in the county.

The Eastern Valley and Wekiva Plain physiographic regions are relatively flat areas on which soils of depressional basins formed in organic material of Holocene age. Soils in slightly higher positions on the landscape formed in clastic sediment of Pleistocene age. Recent fluvial deposits of sands and clays are in many areas along the Wekiva and St. Johns Rivers.

Climate

Seminole County has a humid-subtropical climate. The relatively high year-round temperature and heavy rainfall continuously leach and translocate soluble minerals. This leaching and translocation of soluble minerals result in the soils having only a small content of organic matter and soluble plant nutrients. An exception is the soils that were once covered with organic material and have a fairly high content of organic material in the surface layer. Climate changes account for few differences among the soils.

Plants and Animals

Plants have been the principal biological factor in the formation of soils in the county; but animals, insects, bacteria, and fungi have also been important. Two of the chief functions of plant and animal life are to furnish organic matter and to bring plant nutrients from the lower layers to the upper layers of the soils. In places, plants and animals help supply nitrogen and plant nutrients to the soils and cause differences in soil structure and porosity.

Relief

Relief has affected the formation of soils in Seminole County mainly through its influence on soil-water relationships. Other factors of soil formation generally associated with relief, such as erosion, temperature, and plant cover, are of minor importance.

Seminole County can be divided into two areas based on relief and associated with the major physiographic regions of the county. The flatwoods, flood plains, and marshes are on the Eastern Valley and Wekiva Plain. The upland ridges are on the Orlando Ridge, Osceda Plain, and Geneva Hill. Differences in the soils in these areas are directly related to differences in relief.

The Eastern Valley and Wekiva Plain have elevations dominantly less than 25 feet. The soils in these areas have a high water table, and the surface layer is periodically wet; therefore, these soils are not as highly leached as some of the soils on the upland ridges.

The upland ridges have elevations ranging up to 100 feet. These soils are dominantly excessively drained to well drained and are not influenced by a water table.

Time

Time is an important factor in the formation of soils. Generally, a long time is required for formation of soils that have distinct horizons. The difference in length of time that parent material has been in place commonly is reflected in the degree of development of the soil.

Some basic minerals from which soils are formed weather fairly rapidly; other minerals change slowly even though weathering has taken place over a long period. The translocation of fine particles in the soil to form the various horizons varies under different conditions, but the soil forming processes require a relatively long period. Sand comprised primarily of quartz is highly resistant to weathering and is the dominant geological material in the county. The organic soils of the Eastern Valley and Wekiva Plain were formed by decaying organic material that built up over the years in shallow water.

In terms of geologic time, the soil material that makes up most of the soils in the county is young. Not enough time has elapsed since the material was laid down or emerged from the sea for pronounced genetic horizons to develop. Some loamy horizons have formed in place through the process of weathering. An example is the Apopka soils. A distinct genetic horizon, such as the spodic horizon, has formed in the Immokalee and Myakka soils; however, the time required for its development is relatively short.

Processes of Horizon Differentiation

The main processes involved in the formation of soil horizons are accumulation of organic matter, leaching of calcium carbonate and bases, reduction and transfer of iron, and formation and translocation of silicate clay minerals. These processes can occur in combination, or singly, depending on the integration of the factors of soil formation.

Some organic matter has accumulated in the upper layers of most of the soils to form an A horizon. The quantity of organic matter is small in some of the soils but fairly large in others. Leaching of carbonates and salts has occurred in nearly all of the soils. The effects of leaching have been indirect; in that, the leaching permitted the subsequent translocation of silicate clay materials in some soils. Most of the soils in the county are leached to varying degrees.

The reduction and transfer of iron has occurred in most of the soils of Seminole County but not in the organic soils. In some of the wet soils, iron has been segregated in the lower horizons to form reddish brown mottles and concretions. In the Apopka soil, evidence of weathering and clay movement, or alteration, is present in the form of a light, leached E horizon and a loamy Bt horizon that has sand grains coated and bridged with clay material.

References

(1) American Association of State Highway and Transportation Officials. 1982. Standard specifications for highway materials and methods of sampling and testing. Ed. 13, 2 vol., illus.

(2) American Society for Testing and Materials. 1986. Standard test method for classification of soils for engineering purposes. ASTM Stand. D 2487.

(3) Cooke, C. Wythe. 1945. Geology of Florida. Fla. State Dep. Conserv. & Fla. Geol. Surv. Geol. Bull. 29, 339 pp., illus.

(4) Doolittle, J.A. 1982. Characterizing soil map units with the ground-penetrating radar. Soil Survey Horizons 23(4). Soil Sci. Soc. of Amer., pp. 3-10, illus.

(5) Doolittle, J.A. 1983. Investigating histosols with the ground-penetrating radar. Soil Survey Horizons 24(3). Soil Sci. Soc. of Amer., pp. 23-28, illus.

(6) Florida Crop and Livestock Reporting Service. 1986. Fla. Agric. Stat., Commercial Citrus Inventory, Orlando, Fla.

(7) History and development in Orange and Seminole Counties. 1965. Orange-Seminole Joint Planning Comm., Orlando, Fla.

(8) Johnson, R.W., R. Glaccum, and R. Wojtasenski. 1979. Application of ground-penetrating radar to soil survey. Soil Sci. Soc., Fla. Proc. No. 39. pp 68-72, illus.

(9) Schumacher, F.X., and T.S. Coile. 1960. Growth and yield of natural stands of the southern pines. 237 pp., illus.

(10) Shih, S.F. and J.A. Doolittle. 1984. Using radar to investigate organic soil thickness in the Florida Everglades. Soil Sci. Soc. of Ameri., Vol. 48, No. 3, pp. 651-656, illus.

(11) United States Department of Agriculture. 1929 (Rev. 1976). Volume, yield, and stand tables for second growth southern pines. Forest Serv., Misc. Publ. 50, 302 pp., illus.

(12) United States Department of Agriculture. 1951 (Being revised). Soil survey manual. U.S. Dep. Agric. Handb. 18, 503 pp., illus. (Supplements replacing pp. 173-188 issued May 1962.)

(13) United States Department of Agriculture. 1966. Soil survey of Seminole County, Florida. Soil Conserv. Serv., 83 pp., illus.

(14) United States Department of Agriculture. 1975. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. Soil Conserv. Serv., U.S. Dep. Agric. Handb. 436, 754 pp., illus.

(15) United States Department of Agriculture. 1985. Site index and yield of second growth baldcypress. Soil Conserv. Serv., Tech. Note No. 5, 2 pp.

(16) United States Department of Commerce. 1981. Climatography of the United States, Florida. No. 81. Natl. Climatic Data Center.

(17) University of Florida. 1982. Florida statistical abstract. Bur. of Econ. and Bus. Res., Coll. of Bus. Admin. 712 pp.

(18) White, William A. 1970. The geomorphology of the Florida peninsula. Fla. Dep. Natur. Resour., Bur. of Geol., Bull. 51, 164 pp., illus.

Glossary

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well-aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity is expressed as—

	Inches of water per inch of soil
Very low	Less than 0.05
Low	0.05 to 0.10
Moderate	0.10 to 0.15
High	0.15 to 0.20
Very high	more than 0.20

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation-exchange capacity.

Bedding. A method of controlling excess water in areas of soils used for cultivated crops and tree crops. The surface soil is plowed into regularly-spaced elevated beds, and the crops are planted on the beds. The ditches between the beds drain the excess water.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bisequum. Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity, but is more precise in meaning.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels, i.e., clay coating, clay skin.

Climax vegetation. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15 to 38 centimeters (6 to 15 inches) long.

Coarse textured soil. Sand or loamy sand.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Decreasers. The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

Deferred grazing. Postponing grazing or resting grazingland for a prescribed period.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic)—Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated)—Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, such as fire, that exposes the surface.

Excess fines (in tables). Excess silt and clay are in the soil. The soil is not a source of gravel or sand for construction purposes.

Excess lime (in tables). Excess carbonates in the soil restrict the growth of some plants.

Excess salts (in tables). Excess water-soluble salts in the soil restrict the growth of most plants.

Excess sodium (in tables). Excess exchangeable sodium is in the soil. The resulting poor physical properties restrict the growth of plants.

Fast intake (in tables). The movement of water into the soil is rapid.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fine textured soil. Sandy clay, silty clay, and clay.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Forb. Any herbaceous plant that is not a grass or a sedge.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.5 centimeters) in diameter. An individual piece is a pebble.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric and the more decomposed sapric material.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an upper case letter represents the major horizons. Numbers or lower case letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the *Soil Survey Manual.* The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue at the surface of a mineral soil.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an O, A, or E horizon. The B horizon is, in part, a layer of transition from the overlying horizon to the underlying C horizon. The B horizon also has distinctive characteristics, such as accumulation of clay, sesquioxides, humus, or a combination of these; prismatic or blocky structure; redder or browner colors than those in the A horizon; or a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil does not have a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, the Arabic numeral 2 precedes the letter C.

R layer.—Consolidated rock (unweathered bedrock) beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Increasers. Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the plants that are the less palatable to livestock.

Infiltration. The downward entry of water into the immediate surface of soil or other material. This contrasts with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake in inches per hour is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, invader plants follow disturbance of the surface.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Karst (topography). The relief of an area underlain by limestone that dissolves in differing degrees, thus forming numerous depressions or small basins.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Sandy loam and fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, and silty clay loam.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Muck. Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Open space. A relatively undeveloped green or wooded area provided mainly within an urban area to minimize feelings of congested living.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affects the specified use.

Permeability. The quality of the soil that enables water to move through the profile. Permeability is measured as the number of inches per hour that water moves through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Subsurface tunnels or pipelike cavities are formed by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Poor filter (in tables). Because of rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Poor outlets (in tables). In these areas, surface or subsurface drainage outlets are difficult or expensive to install.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Rangeland. Land on which the potential climax vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Range condition. The present composition of the plant community on a range site in relation to the potential natural plant community for that site. Range condition is expressed as excellent, good, fair, or poor, on the basis of how much the present plant community has departed from the potential.

Range site. An area of rangeland where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. A range site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other range sites in kind or proportion of species or total production.

Reaction, soil. A measure of the acidity or alkalinity of a soil expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). There is a shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saline soil. A soil containing soluble salts in an amount that impairs the growth of plants. A saline soil does not contain excess exchangeable sodium.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Seepage (in tables). The movement of water through the soil adversely affects the specified use.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Sinkhole. A depression in the landscape where limestone has been dissolved.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows:

	Millimeters
Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in organic matter content than the overlying surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Unstable fill (in tables). There is a risk of caving or sloughing on banks of fill material.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Weathering. All physical and chemical changes produced by atmospheric agents in rocks or other deposits at or near the earth's surface. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. This contrasts with poorly graded soil.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Based on data recorded at Sanford, Florida]

Month	Temperature			Precipitation
	Normal total 1951-1980	Daily maximum	Daily minimum	Normal total 1951-1980
	°F	°F	°F	In
January	59.6	71.2	47.9	2.42
February	60.5	72.2	48.7	3.26
March	65.8	77.7	53.8	3.65
April	70.8	83.0	58.5	2.42
May	76.1	87.9	64.3	3.49
June	80.0	90.7	69.2	6.39
July	81.8	92.3	71.2	7.25
August	81.7	91.8	71.7	7.13
September	80.0	89.3	70.6	6.90
October	73.9	83.4	64.3	4.02
November	66.5	77.2	55.8	2.12
December	61.0	72.2	49.8	2.13
Total	71.5	82.4	60.5	51.18

TABLE 2.--AVERAGE COMPOSITION OF SELECTED MAP UNITS

[Average composition determined by Ground-Penetrating Radar (GPR) and hand transect methods*]

Map symbol and soil name	Transects	Soils	Composition	Confidence interval**	Confidence level	Dissimilar soils	Composition
			Pct	Pct	Pct		Pct
2. Adamsville-Sparr fine sands	11	Adamsville-----	46	80-99	90	Immokalee------	4
		Similar soils--	8			Other----------	6
		Sparr----------	36				
4. Astatula fine sand, 0 to 5 percent slopes	10	Astatula-------	52	76-98	90	Apopka---------	1
		Similar soils--	35			Pomello--------	4
						Other----------	8
6. Astatula-Apopka fine sands, 0 to 5 percent slopes	40	Astatula-------	36	84-99	95	Tavares--------	6
		Similar soils--	29			Pomello--------	1
		Apopka---------	21			Other----------	6
		Similar soils--	1				
7. Astatula-Apopka fine sands, 5 to 8 percent slopes	19	Astatula-------	34	77-99	90	Millhopper-----	5
		Similar soils--	29			Tavares--------	5
		Apopka---------	24				
		Similar soils--	3				
8. Astatula-Apopka fine sands, 8 to 12 percent slopes	10	Astatula-------	51	90-99	95	Millhopper-----	3
		Similar soils--	21				
		Apopka---------	21				
		Similar soils--	4				
9. Basinger and Delray fine sands	14	Basinger-------	50	80-99	90	Wabasso--------	1
		Similar soils--	10			Malabar--------	7
		Delray---------	16				
		Similar soils--	16				
10. Basinger, Samsula, and Hontoon soils, depressional	39	Basinger-------	45	76-93	90	EauGallie------	1
		Similar soils--	13			Floridana------	3
		Samsula--------	11			Smyrna---------	1
		Similar soils--	4			Myakka---------	2
		Hontoon--------	9			St. Johns------	2
		Similar soils--	3			Felda----------	2
						Holopaw--------	3
						Others---------	1
11. Basinger and Smyrna fine sands, depressional	21	Basinger-------	38	83-98	95	EauGallie------	4
		Similar soils--	25			Malabar--------	5
		Smyrna---------	20				
		Similar soils--	8				
13. EauGallie and Immokalee fine sands	9	EauGallie------	56	78-99	80	Malabar--------	9
		Immokalee------	18				
		Similar soils--	17				
15. Felda and Manatee mucky fine sands, depressional	14	Felda----------	26	87-99	95	Delray---------	2
		Similar soils--	30			Wabasso--------	4
		Manatee--------	32				
		Similar soils--	6				
16. Immokalee sand	8	Immokalee------	73	81-99	95	EauGallie------	2
		Similar soils--	20			Other----------	5

See footnotes at end of table.

TABLE 2.--AVERAGE COMPOSITION OF SELECTED MAP UNITS--Continued

Map symbol and soil name	Transects	Soils	Composition	Confidence interval**	Confidence level	Dissimilar soils	Composition
			Pct	Pct	Pct		Pct
17. Brighton, Samsula, and Sanibel mucks	15	Brighton-------	20	93-99	95	Basinger-------	4
		Similar soils--	27			Delray---------	2
		Samsula--------	20			Other----------	1
		Similar soils--	15				
		Sanibel--------	11				
18. Malabar fine sand	10	Malabar--------	86	76-96	80	EauGallie------	4
						Basinger-------	5
						Felda----------	5
19. Manatee, Floridana, and Holopaw soils, frequently flooded	10	Manatee--------	26	81-99	80	Basinger-------	1
		Similar soils--	35			Other----------	7
		Floridana------	14				
		Similar soils--	7				
		Holopaw--------	8				
		Similar soils--	2				
20. Myakka and EauGallie fine sands	27	Myakka---------	23	78-99	95	Basinger-------	3
		Similar soils--	35			Pompano--------	7
		EauGallie------	29				
		Similar soils--	3				
21. Nittaw mucky fine sand, depressional	4	Nittaw---------	88	83-99	80	Other----------	6
		Similar soils--	6				
23. Nittaw, Okeelanta, and Basinger soils, frequently flooded	6	Nittaw---------	35	94-99	95	Other----------	2
		Similar soils--	10				
		Okeelanta------	22				
		Similar soils--	12				
		Basinger-------	19				
24. Paola-St. Lucie sands, 0 to 5 percent slopes	8	Paola----------	40	81-99	95	Other----------	5
		Similar soils--	12				
		St. Lucie------	43				
25. Pineda fine sand	9	Pineda---------	46	79-99	95	EauGallie------	3
		Similar soils--	45			Other----------	6
27. Pomello fine sand, 0 to 5 percent slopes	17	Pomello--------	38	78-98	80	Millhopper-----	1
		Similar soils--	49			EauGallie------	8
						Other----------	4
28. Pompano fine sand, occasionally flooded	4	Pompano--------	50	82-99	90	Nittaw---------	5
		Similar soils--	45				
29. St. Johns and EauGallie fine sands	12	St. Johns------	49	81-99	95	Felda----------	7
		Similar soils--	8				
		EauGallie------	12				
		Similar soils--	24				
30. Seffner fine sand	3	Seffner--------	70	82-99	95	Other----------	3
		Similar soils--	27				
31. Tavares-Millhopper fine sands, 0 to 5 percent slopes	27	Tavares--------	41	77-94	80	Pomello--------	1
		Similar soils--	4			Other----------	13
		Millhopper-----	36				
		Similar soils--	5				

See footnotes at end of table.

TABLE 2.--AVERAGE COMPOSITION OF SELECTED MAP UNITS--Continued

Map symbol and soil name	Transects	Soils	Composition	Confidence interval**	Confidence level	Dissimilar soils	Composition
			Pct	Pct	Pct		Pct
32. Tavares-Millhopper fine sands, 5 to 8 percent slopes	5	Tavares--------	58	93-99	95	Other----------	2
		Millhopper-----	35				
		Similar soils--	5				
35. Wabasso fine sand	6	Wabasso--------	88	82-99	95	Pineda---------	6
		Similar soils--	6				

* An example of transect data characterization at a specific confidence level reads: In 80 percent of the areas mapped as Pomello fine sand, 0 to 5 percent slopes, Pomello and similar soils will comprise 78 to 98 percent of the delineation. In the remaining 20 percent of the areas of this map unit, the percentage of Pomello and similar soils may be either higher than 98 percent or lower than 78 percent. Inversely, dissimilar soils make up 2 to 22 percent of most mapped areas.

** The confidence interval is the proportion of named plus similar soils at a given confidence level.

TABLE 3.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
2	Adamsville-Sparr fine sands	2,685	1.4
3	Arents, 0 to 5 percent slopes	1,280	0.7
4	Astatula fine sand, 0 to 5 percent slopes	1,715	0.9
5	Astatula fine sand, 5 to 8 percent slopes	130	0.1
6	Astatula-Apopka fine sands, 0 to 5 percent slopes	13,420	7.0
7	Astatula-Apopka fine sands, 5 to 8 percent slopes	2,430	1.3
8	Astatula-Apopka fine sands, 8 to 12 percent slopes	385	0.2
9	Basinger and Delray fine sands	3,580	1.9
10	Basinger, Samsula, and Hontoon soils, depressional	18,785	9.8
11	Basinger and Smyrna fine sands, depressional	5,625	2.9
12	Canova and Terra Ceia mucks	1,150	0.6
13	EauGallie and Immokalee fine sands	4,215	2.2
14	Felda mucky fine sand, saline, frequently flooded	1,150	0.6
15	Felda and Manatee mucky fine sands, depressional	760	0.4
16	Immokalee sand	3,580	1.9
17	Brighton, Samsula, and Sanibel mucks	1,660	0.9
18	Malabar fine sand	1,020	0.5
19	Manatee, Floridana, and Holopaw soils, frequently flooded	4,730	2.5
20	Myakka and EauGallie fine sands	20,200	10.7
21	Nittaw mucky fine sand, depressional	2,040	1.1
22	Nittaw muck, occasionally flooded	1,910	1.0
23	Nittaw, Okeelanta, and Basinger soils, frequently flooded	4,340	2.3
24	Paola-St. Lucie sands, 0 to 5 percent slopes	3,830	2.0
25	Pineda fine sand	1,280	0.7
26	Udorthents, excavated	380	0.2
27	Pomello fine sand, 0 to 5 percent slopes	5,240	2.7
28	Pompano fine sand, occasionally flooded	2,810	1.5
29	St. Johns and EauGallie fine sands	2,940	1.5
30	Seffner fine sand	250	0.1
31	Tavares-Millhopper fine sands, 0 to 5 percent slopes	12,010	6.3
32	Tavares-Millhopper fine sands, 5 to 8 percent slopes	250	0.1
33	Terra Ceia muck, frequently flooded	640	0.3
34	Urban land, 0 to 12 percent slopes	62,900	33.0
35	Wabasso fine sand	640	0.3
*	Water	779	0.4
	Total	190,739	100.0

* Bodies of water less than 40 acres.

TABLE 4.--YIELDS PER ACRE OF CROPS AND PASTURE

[Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil]

Map symbol and soil name	Oranges	Grapefruit	Corn	Cabbage	Celery	Bahiagrass	Improved bermudagrass
	Boxes	Boxes	Bu	Crates	Crates	AUM*	AUM*
2---------------- Adamsville Sparr	375	475	---	---	---	8.5	10.5
3. Arents							
4, 5------------- Astatula	350	400	---	---	---	3.0	5.5
6---------------- Astatula Apopka	388	475	---	---	---	6.0	8.0
7---------------- Astatula Apopka	395	490	---	---	---	6.0	8.0
8---------------- Astatula Apopka	---	---	---	---	---	6.0	8.0
9---------------- Basinger Delray	---	---	---	365	---	---	---
10--------------- Basinger Samsula Hontoon	---	---	---	---	---	---	---
11--------------- Basinger Smyrna	---	---	---	---	---	---	---
12--------------- Canova Terra Ceia	---	---	140	445	900	---	---
13--------------- EauGallie Immokalee	350	550	85	231	---	8.5	10.5
14--------------- Felda	---	---	110	---	---	---	---
15--------------- Felda Manatee	---	---	---	---	---	---	---
16--------------- Immokalee	350	550	85	200	---	8.5	10.5

See footnote at end of table.

TABLE 4.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Map symbol and soil name	Oranges	Grapefruit	Corn	Cabbage	Celery	Bahiagrass	Improved bermuda-grass
	Boxes	Boxes	Bu	Crates	Crates	AUM*	AUM*
17-------------- Brighton Samsula Sanibel	---	---	140	429	800	---	---
18-------------- Malabar	325	575	---	200	---	8.0	9.0
19-------------- Manatee Floridana Holopaw	---	---	---	---	---	---	---
20-------------- Myakka EauGallie	359	559	85	295	---	8.5	10.5
21-------------- Nittaw	---	---	---	---	---	---	---
22-------------- Nittaw	---	---	120	250	---	12.0	---
23-------------- Nittaw Okeelanta Basinger	---	---	---	---	---	---	---
24-------------- Paola St. Lucie	---	---	---	---	---	---	---
25-------------- Pineda	425	575	---	250	---	8.5	10.5
26. Udorthents							
27-------------- Pomello	250	400	---	---	---	---	---
28-------------- Pompano	---	---	---	---	---	---	---
29-------------- St. Johns EauGallie	330	550	85	280	600	8.5	10.5
30-------------- Seffner	500	700	85	280	800	9.0	---
31-------------- Tavares Millhopper	400	550	---	---	---	8.0	---
32-------------- Tavares Millhopper	425	600	---	---	---	8.5	---

See footnote at end of table.

TABLE 4.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Map symbol and soil name	Oranges	Grapefruit	Corn	Cabbage	Celery	Bahiagrass	Improved bermuda-grass
	Boxes	Boxes	Bu	Crates	Crates	AUM*	AUM*
33-------------- Terra Ceia	---	---	140	250	900	---	---
34. Urban land							
35-------------- Wabasso	350	450	85	250	600	8.5	10.5

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

TABLE 5.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available]

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Productivity class*	Trees to plant
2:										
Adamsville	10W	Slight	Moderate	Moderate	Slight	Moderate	Slash pine	80	10	Slash pine, longleaf pine.
							Longleaf pine	65	5	
							Laurel oak	---	--	
							Water oak	---	--	
							Live oak	---	--	
							Hickory	---	--	
							Black cherry	---	--	
Sparr	10W	Slight	Moderate	Moderate	Slight	Moderate	Slash pine	80	10	Slash pine, loblolly pine, longleaf pine.
							Loblolly pine	80	8	
							Longleaf pine	70	6	
							Laurel oak	---	--	
							Water oak	---	--	
							Live oak	---	--	
							Dogwood	---	--	
							Magnolia	---	--	
							Hickory	---	--	
4, 5 Astatula	3S	Slight	Severe	Moderate	Slight	Slight	Sand pine	60	3	Sand pine, longleaf pine.
							Turkey oak	---	--	
							Bluejack oak	---	--	
6, 7, 8:										
Astatula	3S	Slight	Severe	Moderate	Slight	Slight	Sand pine	60	3	Sand pine, longleaf pine.
							Turkey oak	---	--	
							Bluejack oak	---	--	
							Chapman oak	---	--	
							Live oak	---	--	
Apopka	10S	Slight	Moderate	Moderate	Slight	Slight	Slash pine	80	10	Slash pine, loblolly pine, longleaf pine.
							Loblolly pine	80	8	
							Longleaf pine	70	6	
							Turkey oak	---	--	
							Bluejack oak	---	--	
							Post oak	---	--	
							Live oak	---	--	

See footnotes at end of table.

TABLE 5.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Productivity class*	Trees to plant
9:										
Basinger----------	8W	Slight	Severe	Severe	Slight	Severe	Slash pine----------	70	8	Slash pine.
							Longleaf pine-------	60	4	
							Cabbage palm--------	---	--	
							Loblolly pine-------	---	--	
							Live oak------------	---	--	
							Laurel oak----------	---	--	
Delray------------	11W	Slight	Severe	Severe	Slight	Moderate	Slash pine----------	90	11	Slash pine.
							Longleaf pine-------	70	6	
							Sweetgum------------	90	7	
10:										
Basinger----------	2W	Slight	Severe	Severe	Moderate	Severe	Pondcypress---------	75	2	**
							Baldcypress---------	---	--	
							Pond pine-----------	---	--	
							Blackgum------------	---	--	
							Cabbage palm--------	---	--	
							Carolina ash--------	---	--	
							Loblollybay gordonia	---	--	
							Red maple-----------	---	--	
							Sweetbay------------	---	--	
Samsula-----------	2W	Slight	Severe	Severe	Moderate	Severe	Pondcypress---------	75	2	**
							Baldcypress---------	---	--	
							Pond pine-----------	---	--	
							Blackgum------------	---	--	
							Carolina ash--------	---	--	
							Loblollybay gordonia	---	--	
							Red maple-----------	---	--	
							Sweetbay------------	---	--	
Hontoon-----------	2W	Slight	Severe	Severe	Severe	Severe	Pondcypress---------	75	2	**
							Baldcypress---------	---	--	
							Pond pine-----------	---	--	
							Blackgum------------	---	--	
							Carolina ash--------	---	--	
							Loblollybay gordonia	---	--	
							Red maple-----------	---	--	
							Sweetbay------------	---	--	

See footnotes at end of table.

TABLE 5.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns					Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Productivity class*	
11:										
Basinger	2W	Slight	Severe	Severe	Moderate	Severe	Pondcypress	75	2	**
							Baldcypress	---	--	
							Pond pine	---	--	
							Blackgum	---	--	
							Cabbage palm	---	--	
							Carolina ash	---	--	
							Loblollybay gordonia	---	--	
							Red maple	---	--	
							Sweetbay	---	--	
Smyrna	2W	Slight	Severe	Severe	Moderate	Severe	Pondcypress	75	2	**
							Baldcypress	---	--	
							Pond pine	---	--	
							Blackgum	---	--	
							Cabbage palm	---	--	
							Carolina ash	---	--	
							Loblollybay gordonia	---	--	
							Red maple	---	--	
							Sweetbay	---	--	
12:										
Canova	2W	Slight	Severe	Severe	Moderate	Severe	Pondcypress	75	2	**
							Baldcypress	---	--	
							Blackgum	---	--	
							Red maple	---	--	
							Sweetbay	---	--	
							Carolina ash	---	--	
Terra Ceia	2W	Slight	Severe	Severe	Severe	Severe	Pondcypress	75	2	**
							Baldcypress	---	--	
							Blackgum	---	--	
							Red maple	---	--	
							Sweetbay	---	--	
							Carolina ash	---	--	
13:										
EauGallie	10W	Slight	Moderate	Moderate	Slight	Moderate	Slash pine	80	10	Slash pine, longleaf pine.
							Longleaf pine	70	6	
							Live oak	---	--	
							Water oak	---	--	
Immokalee	8W	Slight	Moderate	Moderate	Moderate	Moderate	Slash pine	70	8	Slash pine, longleaf pine.
							Longleaf pine	65	5	
							Live oak	---	--	
							Water oak	---	--	

See footnotes at end of table.

TABLE 5.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Productivity class*	Trees to plant
15:										
Felda	2W	Slight	Severe	Severe	Moderate	Severe	Pondcypress	75	2	**
							Baldcypress	---	--	
							Blackgum	---	--	
							Cabbage palm	---	--	
							Pond pine	---	--	
							Loblollybay gordonia	---	--	
							Red maple	---	--	
							Sweetbay	---	--	
Manatee	2W	Slight	Severe	Severe	Moderate	Severe	Pondcypress	75	2	**
							Baldcypress	---	--	
							Blackgum	---	--	
							Cabbage palm	---	--	
							Pond pine	---	--	
							Loblollybay gordonia	---	--	
							Red maple	---	--	
							Sweetbay	---	--	
16 Immokalee	8W	Slight	Moderate	Moderate	Moderate	Moderate	Slash pine	70	8	Slash pine, longleaf pine.
							Longleaf pine	65	5	
							Live oak	---	--	
							Water oak	---	--	
17:										
Brighton	2W	Slight	Severe	Severe	Severe	Severe	Pondcypress	75	2	**
							Baldcypress	---	--	
							Blackgum	---	--	
							Cypress	---	--	
							Loblollybay gordonia	---	--	
							Red maple	---	--	
							Sweetbay	---	--	
							Carolina ash	---	--	
							Pond pine	---	--	
Samsula	2W	Slight	Severe	Severe	Moderate	Severe	Pondcypress	75	2	**
							Baldcypress	---	--	
							Pond pine	---	--	
							Blackgum	---	--	
							Carolina ash	---	--	
							Loblollybay gordonia	---	--	
							Red maple	---	--	
							Sweetbay	---	--	

See footnotes at end of table.

TABLE 5.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns					Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Productivity class*	
17:										
Sanibel	2W	Slight	Severe	Severe	Moderate	Severe	Pondcypress	75	2	**
							Baldcypress	---	--	
							Pond pine	---	--	
							Blackgum	---	--	
							Carolina ash	---	--	
							Loblollybay gordonia	---	--	
							Red maple	---	--	
							Sweetbay	---	--	
							Cabbage palm	---	--	
18 Malabar	10W	Slight	Moderate	Severe	Slight	Moderate	Slash pine	80	10	Slash pine.
							Longleaf pine	70	6	
							Cabbage palm	---	--	
							Live oak	---	--	
							Water oak	---	--	
							Laurel oak	---	--	
19:										
Manatee	6W	Slight	Severe	Severe	Moderate	Severe	Baldcypress	100	6	**
							Red maple	---	--	
							Sweetgum	---	--	
							Cabbage palm	---	--	
							Laurel oak	---	--	
							Water oak	---	--	
							Pondcypress	---	--	
							Pond pine	---	--	
Floridana	6W	Slight	Severe	Severe	Moderate	Severe	Baldcypress	100	6	**
							Red maple	---	--	
							Sweetgum	---	--	
							Cabbage palm	---	--	
							Laurel oak	---	--	
							Water oak	---	--	
							Pondcypress	---	--	
							Pond pine	---	--	

See footnotes at end of table.

TABLE 5.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Productivity class*	Trees to plant
19:										
Holopaw	10W	Slight	Severe	Severe	Slight	Severe	Slash pine	80	10	Slash pine.
							Longleaf pine	70	6	
							Sweetgum	---	--	
20:										
Myakka	8W	Slight	Moderate	Moderate	Moderate	Moderate	Slash pine	70	8	Slash pine, longleaf pine.
							Longleaf pine	60	4	
							Water oak	---	--	
							Live oak	---	--	
EauGallie	10W	Slight	Moderate	Moderate	Slight	Moderate	Slash pine	80	10	Slash pine, loblolly pine, longleaf pine.
							Longleaf pine	70	6	
							Water oak	---	--	
							Live oak	---	--	
21 Nittaw	2W	Slight	Severe	Severe	Moderate	Severe	Pondcypress	75	2	**
							Baldcypress	---	--	
							Blackgum	---	--	
							Pond pine	---	--	
							Loblollybay gordonia	---	--	
							Red maple	---	--	
							Sweetbay	---	--	
22 Nittaw	6W	Slight	Severe	Severe	Moderate	Severe	Baldcypress	100	6	**
							Sweetgum	---	--	
							Cabbage palm	---	--	
							Red maple	---	--	
							Laurel oak	---	--	
							Water oak	---	--	
23:										
Nittaw	6W	Slight	Severe	Severe	Moderate	Severe	Baldcypress	100	6	**
							Sweetgum	---	--	
							Cabbage palm	---	--	
							Red maple	---	--	
							Laurel oak	---	--	
							Water oak	---	--	

See footnotes at end of table.

TABLE 5.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordi- nation symbol	Management concerns					Potential productivity			Trees to plant
		Erosion hazard	Equip- ment limita- tion	Seedling mortal- ity	Wind- throw hazard	Plant competi- tion	Common trees	Site index	Produc- tivity class*	
23: Okeelanta----------	6W	Slight	Severe	Severe	Severe	Severe	Baldcypress---------	100	6	**
							Water hickory-------	---	--	
							Cabbage palm--------	---	--	
							Red maple-----------	---	--	
Basinger-----------	6W	Slight	Severe	Severe	Severe	Severe	Baldcypress---------	100	6	**
							Water oak-----------	---	--	
							Sweetgum------------	---	--	
							Laurel oak----------	---	--	
							Red maple-----------	---	--	
							Carolina ash--------	---	--	
							Pond pine-----------	---	--	
24: Paola--------------	2S	Slight	Moderate	Severe	Slight	Slight	Sand pine-----------	50	2	Sand pine.
							Sand live oak-------	---	--	
							Chapman oak---------	---	--	
							Myrtle oak----------	---	--	
							Bluejack oak--------	---	--	
St. Lucie----------	3S	Slight	Severe	Moderate	Slight	Slight	Sand pine-----------	60	3	Sand pine.
							Sand live oak-------	---	--	
							Chapman oak---------	---	--	
							Myrtle oak----------	---	--	
							Bluejack oak--------	---	--	
25------------------ Pineda	10W	Slight	Moderate	Severe	Slight	Moderate	Slash pine----------	80	10	Slash pine, loblolly pine.
							Longleaf pine-------	70	6	
							Cabbage palm--------	---	--	
27------------------ Pomello	8S	Slight	Moderate	Severe	Moderate	Moderate	Slash pine----------	70	8	Slash pine, longleaf pine.
							Longleaf pine-------	60	4	
							Sand pine-----------	60	3	
28------------------ Pompano	6W	Slight	Severe	Severe	Slight	Moderate	Baldcypress---------	100	6	**
							Sweetgum------------	---	--	
							Water oak-----------	---	--	
							Cabbage palm--------	---	--	
							Laurel oak----------	---	--	

See footnotes at end of table.

TABLE 5.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns					Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Productivity class*	
29:										
St. Johns----------	10W	Slight	Moderate	Moderate	Slight	Moderate	Slash pine----------	80	10	Slash pine.
							Longleaf pine-------	70	6	
EauGallie----------	10W	Slight	Moderate	Moderate	Slight	Moderate	Slash pine----------	80	10	Slash pine, loblolly pine.
							Longleaf pine-------	70	6	
30------------------ Seffner	10W	Slight	Moderate	Moderate	Slight	Moderate	Slash pine----------	80	10	Slash pine, longleaf pine.
							Longleaf pine-------	70	6	
							Live oak------------	80	---	
							Laurel oak----------	---	---	
31, 32:										
Tavares------------	10S	Slight	Moderate	Moderate	Slight	Moderate	Slash pine----------	80	10	Slash pine, longleaf pine.
							Longleaf pine-------	70	6	
							Turkey oak----------	---	---	
							Bluejack oak--------	---	---	
Millhopper---------	10S	Slight	Moderate	Moderate	Slight	Moderate	Slash pine----------	80	10	Slash pine, longleaf pine, loblolly pine.
							Loblolly pine-------	80	8	
							Longleaf pine-------	65	5	
							Laurel oak----------	---	---	
							Live oak------------	---	---	
35------------------ Wabasso	10W	Slight	Moderate	Moderate	Slight	Moderate	Slash pine----------	80	10	Slash pine, longleaf pine, loblolly pine.
							Longleaf pine-------	65	5	
							Loblolly pine-------	80	8	
							Live oak------------	---	---	
							Water oak-----------	---	---	

* Productivity class is the yield in cubic meters per hectare per year calculated at the age of culmination of mean annual increment for fully stocked natural stands.

** No recommended trees to plant due to severe ratings for management concerns.

TABLE 6.--RANGELAND PRODUCTIVITY

[Only the soils that support rangeland vegetation suitable for grazing are listed]

Map symbol and soil name	Range site	Potential annual production for kind of growing season		
		Favorable	Average	Unfavorable
		Lb/acre	Lb/acre	Lb/acre
2: Adamsville, Sparr	South Florida Flatwoods	6,000	4,500	3,000
4, 5: Astatula	Longleaf Pine-Turkey Oak Hills	3,500	2,500	1,500
6, 7, 8: Astatula, Apopka	Longleaf Pine-Turkey Oak Hills	4,000	3,000	2,000
9: Basinger, Delray	Slough	8,000	6,000	4,000
10: Basinger, Samsula, Hontoon	Freshwater Marshes and Ponds	10,000	7,500	5,000
11: Basinger, Smyrna	Freshwater Marshes and Ponds	10,000	7,500	5,000
12: Canova, Terra Ceia	Freshwater Marshes and Ponds	10,000	7,500	5,000
13: EauGallie, Immokalee	South Florida Flatwoods	6,000	4,500	3,000
14: Felda	Salt Marsh	8,000	6,000	4,000
15: Felda, Manatee	Freshwater Marshes and Ponds	10,000	7,500	5,000
16: Immokalee	South Florida Flatwoods	6,000	4,500	3,000
17: Brighton, Samsula, Sanibel	Freshwater Marshes and Ponds	10,000	7,500	5,000
18: Malabar	Slough	8,000	6,000	4,000
19: Manatee, Floridana, Holopaw	Freshwater Marshes and Ponds	10,000	7,500	5,000
20: Myakka, EauGallie	South Florida Flatwoods	6,000	4,500	3,000

TABLE 6.--RANGELAND PRODUCTIVITY--Continued

Map symbol and soil name	Range site	Potential annual production for kind of growing season		
		Favorable	Average	Unfavorable
		Lb/acre	Lb/acre	Lb/acre
21: Nittaw	Freshwater Marshes and Ponds	10,000	7,500	5,000
22: Nittaw	Freshwater Marshes and Ponds	10,000	7,500	5,000
23: Nittaw, Okeelanta, Basinger	Freshwater Marshes and Ponds	10,000	7,500	5,000
24: Paola, St. Lucie	Sand Pine Scrub	3,500	2,500	1,500
25: Pineda	Slough	8,000	6,000	4,000
27: Pomello	South Florida Flatwoods	6,000	4,500	3,000
28: Pompano	Slough	8,000	6,000	4,000
29: St. Johns, EauGallie	South Florida Flatwoods	6,000	4,500	3,000
30: Seffner	South Florida Flatwoods	3,500	2,500	2,000
31, 32: Tavares, Millhopper	Longleaf Pine-Turkey Oak Hills	4,000	3,000	2,000
33: Terra Ceia	Freshwater Marshes and Ponds	10,000	7,500	5,000
35: Wabasso	South Florida Flatwoods	6,000	4,500	3,000

TABLE 7.--RECREATIONAL DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
2:					
Adamsville	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty, too sandy.
Sparr	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: wetness, droughty.
3. Arents					
4 Astatula	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
5 Astatula	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Severe: droughty.
6:					
Astatula	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
Apopka	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
7, 8:					
Astatula	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Severe: droughty.
Apopka	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Severe: droughty.
9:					
Basinger	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness.
Delray	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness.	Severe: wetness, too sandy.	Severe: wetness.
10:					
Basinger	Severe: ponding.	Severe: ponding, too sandy.	Severe: too sandy, ponding.	Severe: ponding, too sandy.	Severe: ponding.
Samsula	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
Hontoon	Severe: excess humus, ponding.	Severe: excess humus, ponding.	Severe: excess humus, ponding.	Severe: excess humus, ponding.	Severe: ponding, excess humus.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
11:					
Basinger	Severe: ponding.	Severe: ponding, too sandy.	Severe: too sandy, ponding.	Severe: ponding, too sandy.	Severe: ponding.
Smyrna	Severe: ponding, too sandy.	Severe: ponding, too sandy.	Severe: too sandy, ponding.	Severe: ponding, too sandy.	Severe: ponding.
12:					
Canova	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
Terra Ceia	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
13:					
EauGallie	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness, droughty.
Immokalee	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness, droughty.
14 Felda	Severe: flooding, wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness, flooding.	Severe: wetness, too sandy.	Severe: wetness, droughty, flooding.
15:					
Felda	Severe: ponding, too sandy.	Severe: ponding, too sandy.	Severe: too sandy, ponding.	Severe: ponding, too sandy.	Severe: ponding, droughty.
Manatee	Severe: ponding, too sandy.	Severe: ponding, too sandy.	Severe: too sandy, ponding.	Severe: ponding, too sandy.	Severe: ponding.
16 Immokalee	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness, droughty.
17:					
Brighton	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
Samsula	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
Sanibel	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
18 Malabar	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness, droughty.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
19:					
Manatee	Severe: flooding, wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness, flooding.	Severe: wetness, too sandy.	Severe: wetness, flooding.
Floridana	Severe: flooding, wetness, percs slowly.	Severe: wetness, too sandy, percs slowly.	Severe: too sandy, wetness, flooding.	Severe: wetness, too sandy.	Severe: wetness, flooding.
Holopaw	Severe: flooding, wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness, flooding.	Severe: wetness, too sandy.	Severe: wetness, flooding.
20:					
Myakka	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness.
EauGallie	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness, droughty.
21 Nittaw	Severe: ponding.	Severe: ponding, too sandy.	Severe: too sandy, ponding.	Severe: ponding, too sandy.	Severe: ponding.
22 Nittaw	Severe: flooding, wetness, excess humus.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, excess humus.
23:					
Nittaw	Severe: flooding, wetness, excess humus.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
Okeelanta	Severe: flooding, excess humus, wetness.	Severe: excess humus, wetness.	Severe: excess humus, flooding, wetness.	Severe: excess humus, wetness.	Severe: flooding, excess humus, wetness.
Basinger	Severe: flooding, wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness, flooding.	Severe: wetness, too sandy.	Severe: wetness, flooding.
24:					
Paola	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
St. Lucie	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
25 Pineda	Severe: wetness, percs slowly, too sandy.	Severe: wetness, too sandy, percs slowly.	Severe: too sandy, wetness, percs slowly.	Severe: wetness, too sandy.	Severe: wetness, droughty.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
26. Udorthents					
27------------------- Pomello	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
28------------------- Pompano	Severe: flooding, wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness, droughty.
29: St. Johns------------	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness.
EauGallie------------	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness, droughty.
30------------------- Seffner	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: wetness, droughty.
31: Tavares--------------	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
Millhopper-----------	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty.
32: Tavares--------------	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Severe: droughty.
Millhopper-----------	Severe: too sandy.	Severe: too sandy.	Severe: too sandy, slope.	Severe: too sandy.	Moderate: droughty.
33------------------- Terra Ceia	Severe: wetness, excess humus.	Severe: wetness, excess humus.	Severe: excess humus, wetness, flooding.	Severe: ponding, excess humus, wetness.	Severe: wetness, excess humus, flooding.
34. Urban land					
35------------------- Wabasso	Severe: wetness, percs slowly, too sandy.	Severe: wetness, too sandy, percs slowly.	Severe: too sandy, wetness, percs slowly.	Severe: wetness, too sandy.	Severe: wetness.

TABLE 8.--WILDLIFE HABITAT

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated]

Map symbol and soil name	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Hardwood trees	Conif- erous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
2:										
Adamsville	Poor	Poor	Fair	Fair	Fair	Poor	Poor	Poor	Fair	Poor.
Sparr	Poor	Fair	Good	Fair	Fair	Poor	Fair	Fair	Fair	Poor.
3. Arents										
4, 5 Astatula	Poor	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
6, 7, 8:										
Astatula	Poor	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Apopka	Poor	Fair	Fair	Poor	Fair	Very poor.	Very poor.	Fair	Poor	Very poor.
9:										
Basinger	Poor	Poor	Fair	Poor	Poor	Good	Fair	Poor	Poor	Fair.
Delray	Poor	Poor	Fair	Poor	Poor	Good	Good	Poor	Poor	Good.
10:										
Basinger	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
Samsula	Very poor.	Very poor.	Poor	Fair	Very poor.	Good	Good	Very poor.	Poor	Good.
Hontoon	Very poor.	Very poor.	Poor	Poor	Very poor.	Good	Good	Very poor.	Poor	Good.
11:										
Basinger	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
Smyrna	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Fair	Good	Very poor.	Very poor.	Good.
12:										
Canova	Fair	Fair	---	---	---	Good	Good	Fair	---	Good.
Terra Ceia	Fair	Good	---	---	---	Good	Good	Good	---	Good.
13:										
EauGallie	Poor	Poor	Fair	Poor	Poor	Poor	Poor	Poor	Poor	Poor.
Immokalee	Poor	Poor	Fair	Poor	Poor	Fair	Poor	Poor	Poor	Poor.
14 Felda	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.

TABLE 8.--WILDLIFE HABITAT--Continued

Map symbol and soil name	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
15:										
Felda	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
Manatee	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
16 Immokalee	Poor	Poor	Fair	Poor	Poor	Fair	Poor	Poor	Poor	Poor.
17:										
Brighton	Fair	Good	---	---	---	Good	Good	Good	---	Good.
Samsula	Fair	Good	---	---	---	Good	Good	Good	---	Good.
Sanibel	Fair	Fair	---	---	---	Good	Good	Fair	---	Good.
18 Malabar	Poor	Poor	Poor	Poor	Poor	Fair	Fair	Poor	Poor	Fair.
19:										
Manatee	Poor	Poor	Fair	Poor	Fair	Good	Good	Poor	Poor	Good.
Floridana	Very poor.	Poor	Fair	Poor	Poor	Good	Good	Poor	Poor	Good.
Holopaw	Very poor.	Very poor.	Poor	Fair	Poor	Good	Fair	Very poor.	Fair	Fair.
20:										
Myakka	Poor	Fair	Fair	Poor	Poor	Fair	Poor	Fair	Poor	Poor.
EauGallie	Poor	Poor	Fair	Poor	Poor	Poor	Poor	Poor	Poor	Poor.
21 Nittaw	Very poor.	Very poor.	Very poor.	Poor	Poor	Good	Good	Very poor.	Poor	Good.
22 Nittaw	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
23:										
Nittaw	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Okeelanta	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
Basinger	Very poor.	Very poor.	Poor	Fair	Poor	Fair	Fair	Very poor.	Poor	Fair.
24:										
Paola	Very poor.	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
St. Lucie	Very poor.	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
25 Pineda	Poor	Fair	Fair	Poor	Poor	Good	Fair	Fair	Poor	Fair.

TABLE 8.--WILDLIFE HABITAT--Continued

Map symbol and soil name	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Hardwood trees	Conif- erous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
26. Udorthents										
27----------------- Pomello	Poor	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
28----------------- Pompano	Very poor.	Very poor.	Poor	Fair	Poor	Fair	Fair	Very poor.	Poor	Fair.
29:										
St. Johns---------	Poor	Fair	Fair	Poor	Fair	Fair	Fair	Fair	Fair	Fair.
EauGallie---------	Poor	Poor	Fair	Poor	Poor	Poor	Poor	Poor	Poor	Poor.
30----------------- Seffner	Poor	Poor	Fair	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
31, 32:										
Tavares-----------	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Millhopper--------	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
33----------------- Terra Ceia	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
34. Urban land										
35----------------- Wabasso	Poor	Poor	Poor	Poor	Good	Fair	Poor	Poor	Fair	Poor.

TABLE 9.--BUILDING SITE DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation]

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
2:						
Adamsville	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: droughty, too sandy.
Sparr	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness, droughty.
3. Arents						
4 Astatula	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Severe: droughty.
5 Astatula	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Severe: droughty.
6:						
Astatula	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Severe: droughty.
Apopka	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Severe: droughty.
7:						
Astatula	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Severe: droughty.
Apopka	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Severe: droughty.
8:						
Astatula	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Severe: droughty.
Apopka	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Severe: droughty.
9:						
Basinger	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Delray	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
10:						
Basinger	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Samsula	Severe: cutbanks cave, excess humus, ponding.	Severe: ponding, low strength.	Severe: ponding.	Severe: ponding, low strength.	Severe: ponding.	Severe: ponding, excess humus.
Hontoon	Severe: excess humus, ponding.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding.	Severe: ponding, excess humus.
11:						
Basinger	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Smyrna	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
12:						
Canova	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, excess humus.
Terra Ceia	Severe: excess humus, ponding.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding.	Severe: ponding, excess humus.
13:						
EauGallie	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
Immokalee	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
14 Felda	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, droughty, flooding.
15:						
Felda	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, droughty.
Manatee	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
16 Immokalee	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
17:						
Brighton	Severe: excess humus, ponding.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding.	Severe: ponding, excess humus.
Samsula	Severe: cutbanks cave, excess humus, ponding.	Severe: ponding, low strength.	Severe: ponding.	Severe: ponding, low strength.	Severe: ponding.	Severe: ponding, excess humus.
Sanibel	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, excess humus.
18 Malabar	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
19:						
Manatee	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.
Floridana	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.
Holopaw	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.
20:						
Myakka	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
EauGallie	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
21 Nittaw	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: shrink-swell, low strength, ponding.	Severe: ponding.
22 Nittaw	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: shrink-swell, low strength, wetness.	Severe: wetness, excess humus.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
23:						
Nittaw	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: shrink-swell, low strength, wetness.	Severe: wetness, flooding.
Okeelanta	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: flooding, excess humus, wetness.
Basinger	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.
24:						
Paola	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Severe: droughty.
St. Lucie	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Severe: droughty.
25 Pineda	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
26. Udorthents						
27 Pomello	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Severe: droughty.
28 Pompano	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, droughty.
29:						
St. Johns	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
EauGallie	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
30 Seffner	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness, droughty.
31:						
Tavares	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Slight	Severe: droughty.
Millhopper	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Slight	Moderate: droughty.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
32:						
Tavares	Severe: cutbanks cave.	Slight	Moderate: wetness.	Moderate: slope.	Slight	Severe: droughty.
Millhopper	Severe: cutbanks cave.	Slight	Moderate: wetness.	Moderate: slope.	Slight	Moderate: droughty.
33 Terra Ceia	Severe: excess humus, wetness.	Severe: wetness, low strength, flooding.	Severe: wetness, low strength, flooding.	Severe: wetness, low strength, flooding.	Severe: wetness, low strength, flooding.	Severe: wetness, excess humus, flooding.
34. Urban land						
35 Wabasso	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.

TABLE 10.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "good," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation]

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
2:					
Adamsville	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
Sparr	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
3. Arents					
4, 5 Astatula	Slight	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
6, 7:					
Astatula	Slight*	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Apopka	Slight	Severe: seepage.	Severe: too sandy.	Severe: seepage.	Poor: seepage, too sandy.
8:					
Astatula	Moderate*: slope.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Apopka	Moderate: slope.	Severe: seepage, slope.	Severe: too sandy.	Severe: seepage.	Poor: seepage, too sandy.
9:					
Basinger	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
Delray	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
10:					
Basinger	Severe: ponding, poor filter.	Severe: seepage, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
Samsula	Severe: ponding, poor filter.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, excess humus.	Severe: seepage, ponding.	Poor: ponding, excess humus.
Hontoon	Severe: subsides, ponding, poor filter.	Severe: excess humus, seepage, ponding.	Severe: excess humus, seepage, ponding.	Severe: seepage, ponding.	Poor: excess humus, ponding.
11:					
Basinger	Severe: ponding, poor filter.	Severe: seepage, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
Smyrna	Severe: ponding, poor filter.	Severe: seepage, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
12:					
Canova	Severe: ponding.	Severe: seepage, excess humus, ponding.	Severe: ponding, seepage.	Severe: seepage, ponding.	Poor: ponding.
Terra Ceia	Severe: subsides, ponding, poor filter.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, excess humus.	Severe: seepage, ponding.	Poor: ponding, excess humus.
13:					
EauGallie	Severe: wetness.	Severe: wetness, seepage.	Severe: wetness, seepage, too sandy.	Severe: wetness, seepage.	Poor: too sandy, wetness, seepage.
Immokalee	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
14 Felda	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: wetness, thin layer.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
15:					
Felda	Severe: ponding, poor filter.	Severe: seepage, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
Manatee	Severe: ponding.	Severe: seepage, ponding.	Severe: ponding.	Severe: ponding.	Poor: ponding.
16 Immokalee	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
17:					
Brighton	Severe: subsides, ponding, poor filter.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, excess humus.	Severe: seepage, ponding.	Poor: ponding, excess humus.
Samsula	Severe: ponding, poor filter.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, excess humus.	Severe: seepage, ponding.	Poor: ponding, excess humus.
Sanibel	Severe: ponding, poor filter.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
18 Malabar	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
19:					
Manatee	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, seepage, wetness.	Poor: wetness.
Floridana	Severe: flooding, wetness, percs slowly.	Severe: seepage, flooding.	Severe: flooding, wetness.	Severe: flooding, seepage, wetness.	Poor: wetness.
Holopaw	Severe: flooding, wetness.	Severe: seepage, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, wetness.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
20:					
Myakka	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
EauGallie	Severe: wetness.	Severe: wetness, seepage.	Severe: wetness, seepage, too sandy.	Severe: wetness, seepage.	Poor: too sandy, wetness, seepage.
21 Nittaw	Severe: ponding, percs slowly.	Severe: seepage, ponding.	Severe: seepage, ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
22 Nittaw	Severe: flooding, wetness, percs slowly.	Severe: seepage, flooding, excess humus.	Severe: flooding, seepage, wetness.	Severe: flooding, wetness.	Poor: too clayey, hard to pack, wetness.
23:					
Nittaw	Severe: flooding, wetness, percs slowly.	Severe: seepage, flooding, excess humus.	Severe: flooding, seepage, wetness.	Severe: flooding, wetness.	Poor: too clayey, hard to pack, wetness.
Okeelanta	Severe: flooding, poor filter, wetness.	Severe: seepage, flooding, excess humus.	Severe: seepage, flooding, wetness.	Severe: seepage, flooding, wetness.	Poor: seepage, too sandy, wetness.
Basinger	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, wetness.
24:					
Paola	Slight*	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
St. Lucie	Slight*	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
25 Pineda	Severe: wetness, percs slowly, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
26. Udorthents					
27 Pomello	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
28------------------ Pompano	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, wetness.
29:					
St. Johns----------	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
EauGallie----------	Severe: wetness.	Severe: wetness, seepage.	Severe: wetness, seepage, too sandy.	Severe: wetness, seepage.	Poor: too sandy, wetness, seepage.
30------------------ Seffner	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
31, 32:					
Tavares------------	Moderate*: wetness.	Severe: seepage.	Severe: seepage, wetness, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Millhopper---------	Moderate: wetness.	Severe: seepage.	Severe: too sandy.	Severe: seepage.	Poor: seepage, too sandy.
33------------------ Terra Ceia	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, excess humus.	Severe: flooding, wetness, excess humus.	Severe: flooding, seepage, wetness.	Poor: wetness, excess humus.
34. Urban land					
35------------------ Wabasso	Severe: wetness, percs slowly, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.

* A hazard of ground water contamination is possible where there are many septic tanks because of poor filtration in the soil.

TABLE 11.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation]

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
2:				
Adamsville	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
Sparr	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
3. Arents				
4, 5 Astatula	Good	Probable	Improbable: too sandy.	Poor: too sandy.
6, 7, 8:				
Astatula	Good	Probable	Improbable: too sandy.	Poor: too sandy.
Apopka	Good	Probable	Improbable: too sandy.	Poor: too sandy.
9:				
Basinger	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
Delray	Poor: wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy, wetness.
10:				
Basinger	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
Samsula	Poor: wetness.	Probable	Improbable: too sandy.	Poor: excess humus, wetness.
Hontoon	Poor: wetness.	Improbable: excess humus.	Improbable: excess humus.	Poor: wetness, excess humus.
11:				
Basinger	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
Smyrna	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
12:				
Canova	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess humus, wetness.
Terra Ceia	Poor: wetness.	Probable	Improbable: too sandy.	Poor: excess humus, wetness.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
13:				
EauGallie	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
Immokalee	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
14 Felda	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
15:				
Felda	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
Manatee	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, wetness.
16 Immokalee	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
17:				
Brighton	Poor: wetness.	Improbable: excess humus.	Improbable: excess humus.	Poor: excess humus, wetness.
Samsula	Poor: wetness.	Probable	Improbable: too sandy.	Poor: excess humus, wetness.
Sanibel	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
18 Malabar	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
19:				
Manatee	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, wetness.
Floridana	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, wetness.
Holopaw	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
20:				
Myakka	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
EauGallie	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
21, 22: Nittaw	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too clayey, wetness.
23:				
Nittaw	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too clayey, wetness.
Okeelanta	Poor: wetness.	Probable	Improbable: too sandy.	Poor: excess humus, wetness.
Basinger	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
24:				
Paola	Good	Probable	Improbable: too sandy.	Poor: too sandy.
St. Lucie	Good	Probable	Improbable: too sandy.	Poor: too sandy.
25: Pineda	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
26. Udorthents				
27: Pomello	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
28: Pompano	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
29:				
St. Johns	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
EauGallie	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
30: Seffner	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
31, 32:				
Tavares	Good	Probable	Improbable: too sandy.	Poor: too sandy.
Millhopper	Good	Probable	Improbable: too sandy.	Poor: too sandy.
33: Terra Ceia	Poor: wetness, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess humus, wetness.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
34. Urban land				
35 Wabasso	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.

TABLE 12.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation]

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
2:							
Adamsville	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Droughty.
Sparr	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: slow refill, cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Droughty.
3. Arents							
4, 5 Astatula	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
6, 7:							
Astatula	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
Apopka	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
8:							
Astatula	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, soil blowing.	Slope, too sandy, soil blowing.	Slope, droughty.
Apopka	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, soil blowing.	Slope, too sandy, soil blowing.	Slope, droughty.
9:							
Basinger	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty.
Delray	Severe: seepage.	Severe: seepage, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty.

TABLE 12.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for--			Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
10:							
Basinger----------	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: cutbanks cave.	Ponding, cutbanks cave.	Ponding, droughty, fast intake.	Ponding, too sandy, soil blowing.	Wetness, droughty.
Samsula----------	Severe: seepage.	Severe: excess humus, ponding.	Severe: cutbanks cave.	Ponding, subsides.	Ponding, soil blowing.	Ponding, soil blowing.	Wetness.
Hontoon----------	Severe: seepage.	Severe: excess humus, ponding.	Severe: cutbanks cave.	Subsides, ponding.	Ponding, soil blowing.	Ponding, soil blowing.	Wetness.
11:							
Basinger----------	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: cutbanks cave.	Ponding, cutbanks cave.	Ponding, droughty, fast intake.	Ponding, too sandy, soil blowing.	Wetness, droughty.
Smyrna-----------	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: cutbanks cave.	Ponding, cutbanks cave.	Ponding, droughty, fast intake.	Ponding, too sandy, soil blowing.	Wetness, droughty.
12:							
Canova-----------	Severe: seepage.	Severe: ponding.	Severe: cutbanks cave.	Ponding, subsides.	Ponding, soil blowing, droughty.	Ponding, soil blowing.	Wetness, droughty.
Terra Ceia--------	Severe: seepage.	Excess humus, ponding.	Severe: cutbanks cave.	Ponding, subsides.	Ponding, soil blowing.	Ponding, soil blowing.	Wetness.
13:							
EauGallie---------	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Fast intake, wetness, droughty.	Wetness, too sandy, soil blowing.	Wetness, droughty.
Immokalee---------	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty.
14---------------- Felda	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Flooding--------	Wetness, droughty, fast intake.	Wetness, soil blowing.	Wetness, droughty.

TABLE 12.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
15:							
Felda	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: cutbanks cave.	Ponding, cutbanks cave.	Ponding, droughty, fast intake.	Ponding, too sandy, soil blowing.	Wetness, droughty.
Manatee	Moderate: seepage.	Severe: seepage, piping, ponding.	Severe: cutbanks cave.	Ponding	Ponding, fast intake, soil blowing.	Ponding, soil blowing.	Wetness.
16 Immokalee	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty.
17:							
Brighton	Severe: seepage.	Severe: excess humus, ponding.	Slight	Ponding, subsides.	Ponding, soil blowing.	Ponding, soil blowing.	Wetness.
Samsula	Severe: seepage.	Severe: excess humus, ponding.	Severe: cutbanks cave.	Ponding, subsides.	Ponding, soil blowing.	Ponding, soil blowing.	Wetness.
Sanibel	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: cutbanks cave.	Ponding, subsides, cutbanks cave.	Ponding, droughty, soil blowing.	Ponding, too sandy, soil blowing.	Wetness, droughty.
18 Malabar	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty.
19:							
Manatee	Moderate: seepage.	Severe: wetness.	Severe: cutbanks cave.	Flooding	Wetness, fast intake, soil blowing.	Wetness, soil blowing.	Wetness.
Floridana	Severe: seepage.	Severe: wetness.	Severe: slow refill, cutbanks cave.	Percs slowly, flooding.	Wetness, fast intake, soil blowing.	Wetness, soil blowing, percs slowly.	Wetness, percs slowly.
Holopaw	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Flooding, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty.

TABLE 12.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Limitations for-- Aquifer-fed excavated ponds	Features affecting-- Drainage	Features affecting-- Irrigation	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
20: Myakka	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty.	Wetness, too sandy, soil blowing.	Wetness, droughty.
EauGallie	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Fast intake, wetness, droughty.	Wetness, too sandy, soil blowing.	Wetness, droughty.
21 Nittaw	Slight	Severe: hard to pack, ponding.	Severe: slow refill, cutbanks cave.	Ponding, percs slowly.	Ponding, fast intake, soil blowing.	Ponding, soil blowing, percs slowly.	Wetness, percs slowly.
22 Nittaw	Slight	Severe: hard to pack, wetness.	Severe: slow refill, cutbanks cave.	Percs slowly, flooding.	Wetness, soil blowing.	Wetness, soil blowing, percs slowly.	Wetness, percs slowly.
23: Nittaw	Slight	Severe: hard to pack, wetness.	Severe: slow refill, cutbanks cave.	Percs slowly, flooding.	Wetness, soil blowing.	Wetness, soil blowing, percs slowly.	Wetness, percs slowly.
Okeelanta	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Flooding, subsides, cutbanks cave.	Flooding, wetness, soil blowing.	Wetness, soil blowing, too sandy.	Wetness.
Basinger	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Flooding, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty.
24: Paola	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
St. Lucie	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
25 Pineda	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: slow refill, cutbanks cave.	Percs slowly, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty, percs slowly.

TABLE 12.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
26. Udorthents							
27: Pomello	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Droughty.
28: Pompano	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Flooding, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty.
29: St. Johns	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Wetness, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, too sandy.	Wetness.
EauGallie	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Fast intake, wetness, droughty.	Wetness, too sandy, soil blowing.	Wetness, droughty.
30: Seffner	Severe: seepage.	Severe: seepage, wetness, piping.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Droughty.
31, 32: Tavares	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
Millhopper	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
33: Terra Ceia	Severe: seepage.	Severe: excess humus, wetness.	Slight	Flooding, subsides.	Wetness, soil blowing, flooding.	Wetness, soil blowing.	Wetness.
34. Urban land							
35: Wabasso	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Percs slowly, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty, rooting depth.

TABLE 13.--ENGINEERING INDEX PROPERTIES

[The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated]

Map symbol and soil name	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
2:											
Adamsville------	0-4	Fine sand--------	SP-SM	A-3, A-2-4	0	100	100	90-100	5-12	---	NP
	4-80	Fine sand, sand	SP-SM, SP	A-3, A-2-4	0	100	100	90-100	2-12	---	NP
Sparr-----------	0-4	Fine sand--------	SP-SM, SM	A-3, A-2-4	0	100	100	75-99	5-14	---	NP
	4-41	Sand, fine sand	SP-SM, SM	A-3, A-2-4	0	100	100	75-99	5-14	---	NP
	41-43	Sandy loam, sandy clay loam, fine sandy loam.	SM-SC, SC, SM	A-2-4	0	100	100	75-99	25-35	<30	NP-10
	43-72	Sandy clay, sandy clay loam, sandy loam.	SC, SM-SC	A-2, A-4, A-6	0	100	95-100	75-99	28-50	22-40	5-15
	72-80	Sandy clay loam, sandy loam, fine sandy loam.	SC, SM-SC, SM	A-2, A-4, A-6	0	100	95-100	75-99	25-40	<35	NP-12
3---------------- Arents	0-10	Fine sand--------	SP, SP-SM	A-3, A-2-4, A-1-B	0-15	60-90	50-80	40-70	2-12	---	NP
	10-60	Sand, fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	80-95	2-12	---	NP
4---------------- Astatula	0-4	Fine sand--------	SP, SP-SM	A-3	0	100	100	75-99	1-7	---	NP
	4-80	Sand, fine sand	SP, SP-SM	A-3	0	100	100	75-99	1-7	---	NP
5---------------- Astatula	0-3	Fine sand--------	SP, SP-SM	A-3	0	100	100	75-99	1-7	---	NP
	3-80	Sand, fine sand	SP, SP-SM	A-3	0	100	100	75-99	1-7	---	NP
6:											
Astatula--------	0-4	Fine sand--------	SP, SP-SM	A-3	0	100	100	75-99	1-7	---	NP
	4-80	Sand, fine sand	SP, SP-SM	A-3	0	100	100	75-99	1-7	---	NP
Apopka----------	0-64	Fine sand, sand	SP, SP-SM	A-3	0	100	100	85-100	3-10	---	NP
	64-80	Sandy loam, sandy clay loam, sandy clay.	SM-SC, SC	A-2-4, A-2-6, A-4, A-6	0	98-100	95-100	60-95	20-40	20-40	4-20
7, 8:											
Astatula--------	0-3	Fine sand--------	SP, SP-SM	A-3	0	100	100	75-99	1-7	---	NP
	3-80	Sand, fine sand	SP, SP-SM	A-3	0	100	100	75-99	1-7	---	NP
Apopka----------	0-65	Fine sand, sand	SP, SP-SM	A-3	0	100	100	85-100	3-10	---	NP
	65-80	Sandy loam, sandy clay loam, sandy clay.	SM-SC, SC	A-2-4, A-2-6, A-4, A-6	0	98-100	95-100	60-95	20-40	20-40	4-20

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
9:											
Basinger--------	0-5	Fine sand--------	SP	A-3	0	100	100	85-100	1-4	---	NP
	5-80	Sand, fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	85-100	2-12	---	NP
Delray----------	0-12	Fine sand--------	SP-SM, SM, SM-SC	A-3, A-2-4	0	100	100	95-100	5-20	<20	NP-5
	12-50	Fine sand, sand	SP-SM	A-3, A-2-4	0	100	100	95-100	5-12	---	NP
	50-80	Sandy loam, fine sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4, A-2-6	0	100	100	95-100	20-35	<40	NP-15
10:											
Basinger--------	0-6	Mucky fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	85-100	1-12	---	NP
	6-80	Sand, fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	85-100	2-12	---	NP
Samsula---------	0-26	Muck-------------	PT	---	---	---	---	---	---	---	---
	26-80	Sand, fine sand, loamy sand.	SP-SM, SM, SP	A-3, A-2-4	0	100	100	80-100	2-20	---	NP
Hontoon---------	0-80	Muck-------------	PT	A-8	0	---	---	---	---	---	---
11:											
Basinger--------	0-5	Mucky fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	85-100	1-12	---	NP
	5-80	Sand, fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	85-100	2-12	---	NP
Smyrna----------	0-2	Fine sand--------	SP, SP-SM	A-3, A-2-4	0	100	100	80-100	2-12	---	NP
	2-15	Sand, fine sand	SP, SP-SM	A-3	0	100	100	80-100	2-10	---	NP
	15-25	Sand, fine sand, loamy fine sand.	SM, SP-SM	A-3, A-2-4	0	100	100	80-100	5-20	---	NP
	25-80	Sand, fine sand	SP, SP-SM	A-3	0	100	100	80-100	2-10	---	NP
12:											
Canova----------	0-10	Muck-------------	PT	---	0	---	---	---	---	---	---
	10-27	Sand, fine sand	SP, SP-SM	A-3	0	100	100	70-100	3-10	---	NP
	27-30	Sandy loam, fine sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4, A-2-6	0	100	100	75-95	15-38	<40	NP-20
	30-38	Sandy clay loam	SC	A-2-4, A-2-6	0	100	100	75-95	18-35	20-40	9-26
	38-80	Sandy loam, fine sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4, A-2-6	0	100	80-100	65-95	15-35	<40	NP-20
Terra Ceia------	0-80	Muck-------------	PT	A-8	---	---	---	---	---	---	---

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
13:											
EauGallie-------	0-18	Fine sand--------	SP, SP-SM	A-3	0	100	100	80-98	2-5	---	NP
	18-30	Sand, fine sand	SP-SM, SM	A-3, A-2-4	0	100	100	80-98	5-20	---	NP
	30-45	Sand, fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	80-98	2-12	---	NP
	45-64	Sandy loam, fine sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4, A-2-6	0	100	100	80-98	20-35	<40	NP-20
	64-80	Sand, loamy sand, loamy fine sand.	SP-SM, SM	A-3, A-2-4	0	100	100	80-98	5-25	---	NP
Immokalee-------	0-4	Fine sand--------	SP, SP-SM	A-3	0	100	100	70-100	2-10	---	NP
	4-42	Fine sand, sand	SP, SP-SM	A-3	0	100	100	70-100	2-10	---	NP
	42-62	Fine sand, sand	SP-SM, SM	A-3, A-2-4	0	100	100	70-100	5-21	---	NP
	62-80	Fine sand, sand	SP, SP-SM	A-3	0	100	100	70-100	2-10	---	NP
14--------------- Felda	0-7	Fine sand--------	SP, SP-SM	A-3	0	100	100	90-100	2-5	---	NP
	7-25	Fine sand, sand	SP, SP-SM	A-3	0	100	100	90-100	2-5	---	NP
	25-49	Sandy loam, fine sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4, A-2-6	0	100	100	90-100	15-35	<40	NP-15
	49-80	Fine sand, sand, loamy sand.	SP, SP-SM	A-3, A-2-4	0	100	90-100	80-100	2-12	---	NP
15:											
Felda-----------	0-4	Mucky fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	90-100	2-12	---	NP
	4-28	Sand, fine sand	SP, SP-SM	A-3	0	100	100	90-100	2-5	---	NP
	28-36	Sandy loam, fine sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4, A-2-6	0	100	100	90-100	15-35	<40	NP-15
	36-80	Sand, fine sand, loamy sand.	SP, SP-SM	A-3, A-2-4	0	100	100	80-100	2-12	---	NP
Manatee---------	0-19	Mucky fine sand, fine sand, loamy sand.	SP-SM, SM	A-3, A-2-4	0	100	100	85-100	8-15	---	NP
	19-50	Fine sandy loam, sandy loam.	SM-SC, SC, SM	A-2-4	0	100	100	90-100	18-30	<30	NP-10
	50-80	Fine sandy loam, sandy loam, loamy fine sand.	SM, SM-SC, SC, GM	A-2-4	0-5	60-100	50-100	50-100	13-30	<30	NP-10
16--------------- Immokalee	0-6	Sand-------------	SP, SP-SM	A-3	0	100	100	70-100	2-10	---	NP
	6-36	Fine sand, sand	SP, SP-SM	A-3	0	100	100	70-100	2-10	---	NP
	36-56	Fine sand, sand	SP-SM, SM	A-3, A-2-4	0	100	100	70-100	5-21	---	NP
	56-80	Fine sand, sand	SP, SP-SM	A-3	0	100	100	70-100	2-10	---	NP

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
17:											
Brighton--------	0-8	Muck-------------	PT	---	---	---	---	---	---	---	---
	8-80	Mucky peat-------	PT	---	---	---	---	---	---	---	---
Samsula---------	0-26	Muck-------------	PT	---	---	---	---	---	---	---	---
	26-80	Sand, fine sand, loamy sand.	SP-SM, SM, SP	A-3, A-2-4	0	100	100	80-100	2-20	---	NP
Sanibel---------	0-6	Muck-------------	PT	---	0	---	---	---	---	---	---
	6-8	Sand, fine sand, mucky fine sand.	SP, SP-SM	A-3	0	100	100	80-95	1-10	---	NP
	8-80	Sand, fine sand	SP, SP-SM	A-3	0	100	100	80-95	1-10	---	NP
18--------------- Malabar	0-10	Fine sand--------	SP, SP-SM	A-3	0	100	100	80-100	2-10	---	NP
	10-35	Sand, fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	80-100	3-12	---	NP
	35-48	Sand, fine sand	SP, SP-SM	A-3	0	100	100	80-100	2-10	---	NP
	48-70	Sandy clay loam, fine sandy loam, sandy loam.	SC, SM-SC, SM	A-2, A-4, A-6	0	100	100	80-100	20-40	<35	NP-20
	70-80	Sand, fine sand, loamy fine sand.	SP-SM, SM	A-3, A-2-4	0	100	100	80-100	5-20	---	NP
19:											
Manatee---------	0-10	Fine sand--------	SP-SM, SM	A-3, A-2-4	0	100	100	85-100	8-15	---	NP
	10-52	Fine sandy loam, sandy loam.	SM-SC, SC	A-2-4	0	100	100	90-100	18-30	<30	4-10
	52-80	Fine sandy loam, sandy loam, loamy fine sand.	SM, SM-SC, SC	A-2-4	0-5	60-100	50-100	50-100	13-30	<30	NP-10
Floridana-------	0-18	Mucky fine sand	SP-SM, SM	A-3, A-2-4	0	100	100	80-90	5-25	---	NP
	18-29	Fine sand, sand	SP, SP-SM	A-3	0	100	100	85-95	2-10	---	NP
	29-80	Sandy loam, fine sandy loam, sandy clay loam.	SM-SC, SC	A-2-4, A-2-6	0	100	100	80-95	15-34	20-30	7-16
Holopaw---------	0-50	Fine sand, sand	SP, SP-SM	A-3	0	100	95-100	75-90	2-10	---	NP
	50-80	Fine sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4, A-2-6	0	100	95-100	65-90	15-34	<30	NP-12
20:											
Myakka----------	0-28	Fine sand, sand	SP, SP-SM	A-3	0	100	100	85-100	2-10	---	NP
	28-45	Sand, fine sand, loamy fine sand.	SM, SP-SM	A-3, A-2-4	0	100	100	85-100	5-20	---	NP
	45-80	Sand, fine sand	SP, SP-SM	A-3	0	100	100	85-100	2-8	---	NP
EauGallie-------	0-18	Fine sand--------	SP, SP-SM	A-3	0	100	100	80-98	2-5	---	NP
	18-30	Sand, fine sand	SP-SM, SM	A-3, A-2-4	0	100	100	80-98	5-20	---	NP
	30-41	Sand, fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	80-98	2-12	---	NP
	41-60	Sandy loam, fine sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4, A-2-6	0	100	100	80-98	20-35	<40	NP-20
	60-80	Sand, loamy sand, loamy fine sand.	SP-SM, SM	A-3, A-2-4	0	100	100	80-98	5-25	---	NP

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
21 Nittaw	0-4	Mucky fine sand	SP-SM, SM	A-3, A-2-4	0	100	100	85-100	5-20	---	NP
	4-10	Sand, fine sand, mucky fine sand.	SP-SM, SM	A-3, A-2-4	0	100	100	85-100	5-20	---	NP
	10-50	Sandy clay, clay	CH, CL	A-7	0	100	100	85-100	51-70	40-80	21-50
	50-80	Sand, fine sand, fine sandy loam.	SP, SP-SM, SM, SM-SC	A-3, A-2-4	0	100	100	85-100	4-25	<28	NP-7
22 Nittaw	0-2	Muck	PT	---	---	---	---	---	---	---	---
	2-10	Sand, fine sand, mucky fine sand.	SP-SM, SM	A-3, A-2-4	0	100	100	85-100	5-20	---	NP
	10-60	Sandy clay, clay	CH, CL	A-7	0	100	100	85-100	51-70	40-80	21-50
	60-80	Sand, fine sand, fine sandy loam.	SP, SP-SM, SM, SM-SC	A-3, A-2-4	0	100	100	85-100	4-25	<28	NP-7
23: Nittaw	0-4	Muck	PT	---	---	---	---	---	---	---	---
	4-9	Sand, fine sand, mucky fine sand.	SP-SM, SM	A-3, A-2-4	0	100	100	85-100	5-20	---	NP
	9-80	Sandy clay, clay	CH, CL	A-7	0	100	100	85-100	51-70	40-80	21-50
Okeelanta	0-42	Muck	PT	A-8	0	---	---	---	---	---	---
	42-80	Fine sand, sand, loamy sand.	SP, SP-SM, SM	A-3, A-2-4	0	100	85-100	80-95	2-15	---	NP
Basinger	0-22	Fine sand	SP	A-3	0	100	100	85-100	1-4	---	NP
	22-80	Sand, fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	85-100	2-12	---	NP
24: Paola	0-3	Sand	SP	A-3	0	100	100	85-100	1-2	---	NP
	3-25	Sand, fine sand	SP	A-3	0	100	100	85-100	1-2	---	NP
	25-80	Sand, fine sand	SP	A-3	0	100	100	80-100	1-4	---	NP
St. Lucie	0-2	Sand	SP	A-3	0	100	90-100	80-99	1-4	---	NP
	2-80	Sand, fine sand	SP	A-3	0	100	90-100	80-99	1-4	---	NP
25 Pineda	0-1	Fine sand	SP, SP-SM	A-3	0	100	100	80-95	2-8	---	NP
	1-26	Sand, fine sand	SP, SP-SM	A-3	0	100	100	80-95	2-10	---	NP
	26-68	Sandy loam, fine sandy loam, sandy clay loam.	SC, SM-SC, SM	A-2-4, A-2-6	0	100	100	65-95	15-35	<35	NP-20
	68-80	Sand, loamy sand, fine sand.	SP-SM, SM, SP	A-3, A-2-4	0	95-100	90-100	80-95	4-15	---	NP
26. Udorthents											
27 Pomello	0-31	Fine sand	SP, SP-SM	A-3	0	100	100	60-100	1-8	---	NP
	31-40	Coarse sand, sand, fine sand.	SP-SM, SM	A-3, A-2-4	0	100	100	60-100	6-15	---	NP
	40-80	Coarse sand, sand, fine sand.	SP, SP-SM	A-3	0	100	100	60-100	4-10	---	NP

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
28 Pompano	0-4	Fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	75-100	1-12	---	NP
	4-80	Fine sand, sand	SP, SP-SM	A-3, A-2-4	0	100	100	75-100	1-12	---	NP
29: St. Johns	0-12	Fine sand	SP, SP-SM	A-3	0	100	100	75-95	3-10	---	NP
	12-22	Sand, fine sand	SP, SP-SM	A-3	0	100	100	85-95	3-10	---	NP
	22-54	Sand, fine sand, loamy fine sand.	SP-SM, SM	A-3, A-2-4	0	100	100	85-95	5-20	---	NP
	54-80	Sand, fine sand	SP, SP-SM	A-3	0	100	100	80-90	2-10	---	NP
EauGallie	0-16	Fine sand, sand	SP, SP-SM	A-3	0	100	100	80-98	2-5	---	NP
	16-35	Sand, fine sand	SP-SM, SM	A-3, A-2-4	0	100	100	80-98	5-20	---	NP
	35-38	Sand, fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	80-98	2-12	---	NP
	38-72	Sandy loam, fine sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4, A-2-6	0	100	100	80-98	20-35	<40	NP-20
	72-80	Sand, loamy sand, loamy fine sand.	SP-SM, SM	A-3, A-2-4	0	100	100	80-98	5-25	---	NP
30 Seffner	0-15	Fine sand	SP-SM, SP	A-3, A-2-4	0	100	100	85-100	1-12	---	NP
	15-80	Fine sand, sand	SP-SM, SP	A-3, A-2-4	0	97-100	75-100	70-100	1-12	---	NP
31: Tavares	0-6	Fine sand	SP, SP-SM	A-3	0	100	95-100	85-100	2-10	---	NP
	6-80	Sand, fine sand	SP, SP-SM	A-3	0	100	95-100	85-100	2-10	---	NP
Millhopper	0-45	Fine sand	SP-SM, SM	A-3, A-2-4	0	100	97-100	75-95	5-20	---	NP
	45-80	Sandy loam, fine sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4, A-4	0	100	97-100	75-95	18-40	<28	NP-10
32: Tavares	0-9	Fine sand	SP, SP-SM	A-3	0	100	95-100	85-100	2-10	---	NP
	9-80	Sand, fine sand	SP, SP-SM	A-3	0	100	95-100	85-100	2-10	---	NP
Millhopper	0-50	Fine sand	SP-SM, SM	A-3, A-2-4	0	100	97-100	75-95	5-20	---	NP
	50-80	Sandy loam, fine sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4, A-4	0	100	97-100	75-95	18-40	<28	NP-10
33 Terra Ceia	0-80	Muck	PT	A-8	---	---	---	---	---	---	---

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
34. Urban land											
35--------------- Wabasso	0-4	Fine sand--------	SP, SP-SM	A-3	0	100	100	95-100	2-10	---	NP
	4-18	Sand, fine sand	SP, SP-SM	A-3	0	100	100	95-100	2-10	---	NP
	18-25	Sand, fine sand, loamy sand.	SP-SM, SM	A-3, A-2-4	0	100	100	95-100	5-20	---	NP
	25-27	Sand, fine sand	SP, SP-SM	A-3	0	100	100	95-100	2-10	---	NP
	27-70	Sandy loam, fine sandy loam, sandy clay loam.	SC, SM-SC	A-2-4, A-2-6	0	100	100	95-100	20-35	20-30	5-13
	70-80	Sand, fine sand, loamy sand.	SP-SM, SM	A-3, A-2-4	0	100	100	95-100	5-20	---	NP

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

[The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated]

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH	mmhos/cm					Pct
2:												
Adamsville------	0-4	1-8	1.35-1.65	6.0-20	0.05-0.10	4.5-7.8	<2	Low-------	0.10	5	2	<2
	4-80	1-7	1.35-1.65	6.0-20	0.03-0.08	4.5-7.8	<2	Low-------	0.10			
Sparr-----------	0-4	1-5	1.20-1.50	6.0-20	0.08-0.12	3.6-6.5	<2	Low-------	0.10	5	2	<3
	4-41	1-5	1.45-1.70	6.0-20	0.05-0.08	3.6-6.5	<2	Low-------	0.10			
	41-43	15-32	1.55-1.80	0.6-2.0	0.10-0.15	3.6-6.5	<2	Low-------	0.20			
	43-72	12-38	1.55-1.80	0.06-0.6	0.10-0.18	3.6-6.5	<2	Low-------	0.24			
	72-80	15-30	1.55-1.70	0.06-0.6	0.10-0.15	3.6-6.5	<2	Low-------	0.24			
3--------------- Arents	0-10	1-10	1.35-1.55	6.0-20	0.02-0.08	6.6-8.4	<2	Low-------	0.10	5	2	<.5
	10-32	1-10	1.35-1.55	6.0-20	0.02-0.08	5.6-8.4	<2	Low-------	0.10			
	32-60	1-10	1.35-1.55	6.0-20	0.02-0.08	5.6-6.5	<2	Low-------	0.10			
4--------------- Astatula	0-4	1-3	1.25-1.50	>20	0.04-0.10	4.5-6.5	<2	Low-------	0.10	5	2	.5-2
	4-80	1-3	1.45-1.60	>20	0.02-0.05	4.5-6.5	<2	Low-------	0.10			
5--------------- Astatula	0-3	1-3	1.25-1.50	>20	0.04-0.10	4.5-6.5	<2	Low-------	0.10	5	2	.5-2
	3-80	1-3	1.45-1.60	>20	0.02-0.05	4.5-6.5	<2	Low-------	0.10			
6:												
Astatula--------	0-4	1-3	1.25-1.50	>20	0.04-0.10	4.5-6.5	<2	Low-------	0.10	5	2	.5-2
	4-80	1-3	1.45-1.60	>20	0.02-0.05	4.5-6.5	<2	Low-------	0.10			
Apopka----------	0-64	<3	1.45-1.60	6.0-20	0.03-0.05	4.5-6.0	<2	Low-------	0.10	5	2	<2
	64-80	18-37	1.55-1.75	0.6-2.0	0.12-0.17	4.5-6.0	<2	Low-------	0.24			
7, 8:												
Astatula--------	0-3	1-3	1.25-1.50	>20	0.04-0.10	4.5-6.5	<2	Low-------	0.10	5	2	.5-2
	3-80	1-3	1.45-1.60	>20	0.02-0.05	4.5-6.5	<2	Low-------	0.10			
Apopka----------	0-65	<3	1.45-1.60	6.0-20	0.03-0.05	4.5-6.0	<2	Low-------	0.10	5	2	<2
	65-80	18-37	1.55-1.75	0.6-2.0	0.12-0.17	4.5-6.0	<2	Low-------	0.24			
9:												
Basinger--------	0-5	0-4	1.40-1.55	6.0-20	0.03-0.07	3.6-7.3	<2	Low-------	0.10	5	2	.5-2
	5-30	0-4	1.40-1.55	6.0-20	0.05-0.10	3.6-7.3	<2	Low-------	0.10			
	30-50	1-6	1.40-1.65	6.0-20	0.10-0.15	3.6-7.3	<2	Low-------	0.10			
	50-80	1-3	1.50-1.70	6.0-20	0.05-0.10	3.6-7.3	<2	Low-------	0.10			
Delray----------	0-12	3-13	1.35-1.45	6.0-20	0.10-0.15	5.6-7.3	<2	Low-------	0.10	5	2	2-5
	12-50	1-7	1.50-1.65	6.0-20	0.05-0.08	6.1-7.3	<2	Low-------	0.10			
	50-80	13-30	1.45-1.60	0.6-6.0	0.10-0.15	6.6-7.8	<2	Low-------	0.24			
10:												
Basinger--------	0-6	1-6	1.15-1.30	6.0-20	0.15-0.20	3.6-7.3	<2	Low-------	0.10	5	2	8-20
	6-18	0-4	1.40-1.55	6.0-20	0.05-0.10	3.6-7.3	<2	Low-------	0.10			
	18-35	1-3	1.40-1.65	6.0-20	0.10-0.15	3.6-7.3	<2	Low-------	0.10			
	35-80	1-3	1.50-1.70	6.0-20	0.05-0.10	3.6-7.3	<2	Low-------	0.10			
Samsula---------	0-26	---	0.25-0.50	6.0-20	0.20-0.25	4.5-5.5	<2	Low-------	----	2	2	>20
	26-80	1-14	1.35-1.55	6.0-20	0.02-0.05	3.6-5.5	<2	Low-------	0.17			
Hontoon---------	0-80	---	0.20-0.40	6.0-20	0.30-0.50	3.6-5.5	<2	Low-------	----	---	2	75-85

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH	mmhos/cm					Pct
11:												
Basinger--------	0-5	1-6	1.15-1.30	6.0-20	0.15-0.20	3.6-7.3	<2	Low--------	0.10	5	2	8-20
	5-15	0-4	1.40-1.55	6.0-20	0.05-0.10	3.6-7.3	<2	Low--------	0.10			
	15-25	1-3	1.40-1.65	6.0-20	0.10-0.15	3.6-7.3	<2	Low--------	0.10			
	25-80	1-3	1.50-1.70	6.0-20	0.05-0.10	3.6-7.3	<2	Low--------	0.10			
Smyrna----------	0-2	1-6	1.15-1.45	6.0-20	0.05-0.10	3.6-6.5	<2	Low--------	0.10	5	2	1-5
	2-15	0-3	1.35-1.45	6.0-20	0.02-0.05	3.6-6.5	<2	Low--------	0.10			
	15-25	3-8	1.35-1.45	0.6-6.0	0.10-0.20	3.6-6.5	<2	Low--------	0.15			
	25-80	1-6	1.50-1.70	6.0-20	0.03-0.07	3.6-6.5	<2	Low--------	0.10			
12:												
Canova----------	0-10	---	0.20-0.40	6.0-20	0.10-0.20	4.5-6.5	<2	Low--------	0.10	5	2	35-75
	10-27	1-6	1.35-1.50	6.0-20	0.02-0.05	5.6-8.4	<2	Low--------	0.10			
	27-30	15-34	1.60-1.70	0.6-6.0	0.10-0.15	5.6-8.4	<2	Low--------	0.28			
	30-38	18-34	1.60-1.70	0.6-2.0	0.10-0.15	7.4-8.4	<2	Low--------	0.28			
	38-80	15-25	1.60-1.70	0.6-6.0	0.10-0.15	7.4-8.4	<2	Low--------	0.28			
Terra Ceia------	0-80	---	0.15-0.35	6.0-20	0.30-0.50	4.5-8.4	<2	Low--------	----	---	2	60-90
13:												
EauGallie-------	0-18	<5	1.25-1.50	6.0-20	0.02-0.07	4.5-6.0	<2	Low--------	0.10	5	2	2-8
	18-30	1-8	1.45-1.60	0.6-6.0	0.15-0.25	4.5-6.5	<2	Low--------	0.15			
	30-45	1-5	1.45-1.65	6.0-20	0.02-0.05	4.5-7.8	<2	Low--------	0.10			
	45-64	13-31	1.55-1.70	0.06-2.0	0.10-0.20	4.5-7.8	<2	Low--------	0.20			
	64-80	1-13	1.45-1.55	0.6-6.0	0.05-0.15	4.5-7.8	<2	Low--------	0.15			
Immokalee-------	0-4	1-5	1.20-1.50	6.0-20	0.05-0.10	3.6-6.0	<2	Low--------	0.10	5	2	1-2
	4-42	1-5	1.45-1.70	6.0-20	0.02-0.05	3.6-6.0	<2	Low--------	0.10			
	42-62	2-7	1.30-1.60	0.6-2.0	0.10-0.25	3.6-6.0	<2	Low--------	0.15			
	62-80	1-5	1.40-1.60	6.0-20	0.02-0.05	3.6-6.0	<2	Low--------	0.10			
14--------------- Felda	0-7	1-3	1.40-1.55	6.0-20	0.01-0.05	6.1-7.8	2-4	Low--------	0.10	5	2	1-6
	7-25	1-3	1.40-1.55	6.0-20	0.01-0.05	6.1-7.8	2-4	Low--------	0.10			
	25-49	13-30	1.50-1.65	0.6-6.0	0.05-0.10	6.1-7.8	2-4	Low--------	0.24			
	49-80	1-10	1.50-1.65	6.0-20	0.01-0.05	6.1-7.8	2-4	Low--------	0.10			
15:												
Felda-----------	0-4	1-6	1.15-1.30	6.0-20	0.15-0.20	6.1-7.8	<2	Low--------	0.10	4	2	10-20
	4-28	1-3	1.45-1.55	6.0-20	0.02-0.05	6.1-7.8	<2	Low--------	0.10			
	28-36	13-30	1.50-1.60	0.6-6.0	0.10-0.15	6.1-7.8	<2	Low--------	0.24			
	36-80	1-10	1.50-1.65	6.0-20	0.02-0.05	6.1-8.4	<2	Low--------	0.17			
Manatee---------	0-19	2-8	1.00-1.20	2.0-6.0	0.15-0.25	5.6-7.8	<2	Low--------	0.10	5	2	15-30
	19-50	10-20	1.50-1.65	0.6-2.0	0.10-0.15	6.6-8.4	<2	Low--------	0.24			
	50-80	6-20	1.55-1.70	0.6-2.0	0.08-0.15	7.4-8.4	<2	Low--------	0.24			
16--------------- Immokalee	0-6	1-5	1.20-1.50	6.0-20	0.05-0.10	3.6-6.0	<2	Low--------	0.10	5	2	1-2
	6-36	1-5	1.45-1.70	6.0-20	0.02-0.05	3.6-6.0	<2	Low--------	0.10			
	36-56	2-7	1.30-1.60	0.6-2.0	0.10-0.25	3.6-6.0	<2	Low--------	0.15			
	56-80	1-5	1.40-1.60	6.0-20	0.02-0.05	3.6-6.0	<2	Low--------	0.10			
17:												
Brighton--------	0-8	---	0.15-0.35	6.0-20	0.20-0.50	3.6-4.4	<2	Low--------	0.10	2	2	60-90
	8-80	---	0.15-0.35	6.0-20	0.20-0.40	3.6-4.4	<2	Low--------	----			
Samsula---------	0-26	---	0.25-0.50	6.0-20	0.20-0.25	4.5-5.5	<2	Low--------	----	2	2	>20
	26-80	1-14	1.35-1.55	6.0-20	0.02-0.05	3.6-5.5	<2	Low--------	0.17			
Sanibel---------	0-6	---	0.30-0.55	6.0-20	0.20-0.50	3.6-7.3	<2	Low--------	0.10	4	2	20-50
	6-8	2-6	1.40-1.60	6.0-20	0.10-0.15	3.6-7.3	<2	Low--------	0.10			
	8-80	2-6	1.50-1.65	6.0-20	0.03-0.10	3.6-7.3	<2	Low--------	0.10			

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH	mmhos/cm					Pct
18---------------- Malabar	0-10	0-4	1.35-1.55	6.0-20	0.03-0.08	5.1-8.4	<2	Low--------	0.10	5	2	1-2
	10-35	1-5	1.35-1.70	6.0-20	0.05-0.10	5.1-8.4	<2	Low--------	0.10			
	35-48	1-5	1.40-1.70	6.0-20	0.02-0.05	5.1-8.4	<2	Low--------	0.10			
	48-70	12-25	1.55-1.75	<0.2	0.10-0.15	5.1-8.4	<2	Low--------	0.24			
	70-80	1-8	1.40-1.70	6.0-20	0.03-0.08	5.1-8.4	<2	Low--------	0.15			
19:												
Manatee----------	0-10	2-8	1.20-1.40	2.0-6.0	0.15-0.20	5.6-7.8	<2	Low--------	0.10	5	2	4-15
	10-52	10-20	1.50-1.65	0.6-2.0	0.10-0.15	6.6-7.8	<2	Low--------	0.24			
	52-80	6-20	1.55-1.70	0.6-2.0	0.08-0.15	7.4-8.4	<2	Low--------	0.24			
Floridana--------	0-18	3-10	1.40-1.50	6.0-20	0.10-0.20	4.5-8.4	<2	Low--------	0.10	5	2	6-15
	18-29	1-7	1.50-1.60	6.0-20	0.05-0.10	4.5-8.4	<2	Low--------	0.10			
	29-80	15-30	1.60-1.70	<0.2	0.10-0.20	4.5-8.4	<2	Low--------	0.24			
Holopaw----------	0-50	2-5	1.20-1.60	6.0-20	0.03-0.07	5.1-7.3	<2	Low--------	0.10	5	2	1-4
	50-80	16-24	1.50-1.70	0.6-2.0	0.10-0.15	5.1-8.4	<2	Low--------	0.24			
20:												
Myakka-----------	0-5	1-3	1.25-1.45	6.0-20	0.05-0.15	3.6-6.5	<2	Low--------	0.10	5	2	2-5
	5-28	0-2	1.45-1.60	6.0-20	0.02-0.05	3.6-6.5	<2	Low--------	0.10			
	28-45	1-8	1.45-1.60	0.6-6.0	0.10-0.20	3.6-6.5	<2	Low--------	0.15			
	45-80	0-2	1.48-1.70	6.0-20	0.02-0.10	3.6-6.5	<2	Low--------	0.10			
EauGallie--------	0-18	<5	1.25-1.50	6.0-20	0.02-0.07	4.5-6.0	<2	Low--------	0.10	5	2	2-8
	18-30	1-8	1.45-1.60	0.6-6.0	0.15-0.25	4.5-6.5	<2	Low--------	0.15			
	30-41	1-5	1.45-1.65	6.0-20	0.02-0.05	4.5-7.8	<2	Low--------	0.10			
	41-60	13-31	1.55-1.70	0.06-2.0	0.10-0.20	4.5-7.8	<2	Low--------	0.20			
	60-80	1-13	1.45-1.55	0.6-6.0	0.05-0.15	4.5-7.8	<2	Low--------	0.15			
21---------------- Nittaw	0-4	1-10	1.15-1.30	6.0-20	0.15-0.20	5.6-7.3	<2	Low--------	0.10	5	2	10-20
	4-10	1-10	1.25-1.55	6.0-20	0.05-0.15	5.6-7.3	<2	Low--------	0.10			
	10-50	35-60	1.25-1.55	0.06-0.2	0.15-0.20	5.6-8.4	<2	High-------	0.32			
	50-80	1-20	1.45-1.70	6.0-20	0.05-0.10	6.6-8.4	<2	Low--------	0.20			
22---------------- Nittaw	0-2	---	0.20-1.00	6.0-20	0.20-0.25	3.6-4.4	<2	Low--------	----	---	2	20-90
	2-10	1-10	1.25-1.55	6.0-20	0.05-0.15	5.6-7.3	<2	Low--------	0.10			
	10-60	35-60	1.35-1.55	0.06-0.2	0.15-0.18	5.6-8.4	<2	High-------	0.32			
	60-80	1-20	1.45-1.70	6.0-20	0.05-0.10	6.6-8.4	<2	Low--------	0.20			
23:												
Nittaw-----------	0-4	---	0.20-1.00	6.0-20	0.20-0.25	3.6-4.4	<2	Low--------	----	---	2	20-90
	4-9	1-10	1.25-1.55	6.0-20	0.05-0.15	5.6-7.3	<2	Low--------	0.10			
	9-80	35-60	1.35-1.55	0.06-0.2	0.15-0.18	5.6-8.4	<2	High-------	0.32			
Okeelanta--------	0-42	---	0.15-0.35	6.0-20	0.20-0.45	6.6-7.3	<2	Low--------	----	---	2	60-85
	42-80	1-5	1.30-1.55	6.0-20	0.05-0.10	6.6-8.4	<2	Low--------	0.10			
Basinger---------	0-22	0-4	1.40-1.55	6.0-20	0.03-0.07	3.6-7.3	<2	Low--------	0.10	5	2	.2-1
	22-38	1-6	1.40-1.65	6.0-20	0.10-0.15	3.6-7.3	<2	Low--------	0.10			
	38-80	1-3	1.50-1.70	6.0-20	0.05-0.10	3.6-7.3	<2	Low--------	0.10			
24:												
Paola------------	0-3	0-2	1.20-1.45	>20	0.02-0.05	3.6-7.3	<2	Low--------	0.10	5	1	<.5
	3-25	0-2	1.45-1.60	>20	0.02-0.05	3.6-7.3	<2	Low--------	0.10			
	25-80	0-3	1.45-1.60	>20	0.02-0.05	3.6-7.3	<2	Low--------	0.10			
St. Lucie--------	0-2	0-1	1.50-1.60	>20	0.02-0.05	3.6-7.3	<2	Low--------	0.10	5	1	0-1
	2-80	0-1	1.50-1.60	>20	0.02-0.03	3.6-7.3	<2	Low--------	0.10			

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors		Wind erodi- bility group	Organic matter
									K	T		
	In	Pct	G/cc	In/hr	In/in	pH	mmhos/cm					Pct
25--------------- Pineda	0-1	1-6	1.25-1.60	6.0-20	0.05-0.10	4.5-7.3	<2	Low--------	0.10	5	2	.5-6
	1-26	1-8	1.40-1.70	6.0-20	0.02-0.05	4.5-7.3	<2	Low--------	0.10			
	26-68	10-25	1.50-1.70	<0.2	0.10-0.15	5.1-8.4	<2	Low--------	0.24			
	68-80	3-12	1.45-1.60	2.0-6.0	0.02-0.05	5.6-8.4	<2	Low--------	0.10			
26. Udorthents												
27--------------- Pomello	0-31	<2	1.35-1.65	>20	0.02-0.05	4.5-6.0	<2	Low--------	0.10	5	1	<1
	31-40	<2	1.45-1.60	2.0-6.0	0.10-0.30	4.5-6.0	<2	Low--------	0.15			
	40-80	<2	1.35-1.65	6.0-20	0.02-0.05	4.5-6.0	<2	Low--------	0.10			
28--------------- Pompano	0-4	0-8	1.20-1.50	6.0-20	0.02-0.05	4.5-7.8	<2	Low--------	0.10	5	2	1-4
	4-80	0-8	1.45-1.65	6.0-20	0.02-0.05	4.5-7.8	<2	Low--------	0.10			
29: St. Johns--------	0-12	1-4	1.30-1.50	6.0-20	0.10-0.15	3.6-5.5	<2	Low--------	0.10	5	2	2-4
	12-22	1-3	1.50-1.70	6.0-20	0.03-0.08	3.6-5.5	<2	Low--------	0.10			
	22-54	2-6	1.50-1.58	0.2-2.0	0.10-0.30	3.6-5.5	<2	Low--------	0.15			
	54-80	1-4	1.50-1.65	6.0-20	0.03-0.08	3.6-5.5	<2	Low--------	0.10			
EauGallie--------	0-16	<5	1.25-1.50	6.0-20	0.02-0.07	4.5-6.0	<2	Low--------	0.10	5	2	2-8
	16-35	1-8	1.45-1.60	0.6-6.0	0.15-0.25	4.5-6.5	<2	Low--------	0.15			
	35-38	1-5	1.45-1.65	6.0-20	0.02-0.05	4.5-7.8	<2	Low--------	0.10			
	38-72	13-31	1.55-1.70	0.06-2.0	0.10-0.20	4.5-7.8	<2	Low--------	0.20			
	72-80	1-13	1.45-1.55	0.6-6.0	0.05-0.15	4.5-7.8	<2	Low--------	0.15			
30--------------- Seffner	0-15	1-8	1.35-1.45	6.0-20	0.07-0.12	4.5-7.3	<2	Low--------	0.10	5	2	1-5
	15-80	1-8	1.50-1.60	6.0-20	0.04-0.08	4.5-7.3	<2	Low--------	0.10			
31: Tavares----------	0-6	0-4	1.25-1.60	>6.0	0.05-0.10	3.6-6.0	<2	Low--------	0.10	5	2	.5-2
	6-80	0-4	1.40-1.70	>6.0	0.02-0.05	3.6-6.0	<2	Low--------	0.10			
Millhopper-------	0-45	2-8	1.50-1.67	6.0-20	0.05-0.10	4.5-6.5	<2	Low--------	0.10	5	2	.5-2
	45-80	12-28	1.80-1.90	0.06-2.0	0.08-0.15	4.5-6.0	<2	Low--------	0.28			
32: Tavares----------	0-9	0-4	1.25-1.60	>6.0	0.05-0.10	3.6-6.0	<2	Low--------	0.10	5	2	.5-2
	9-80	0-4	1.40-1.70	>6.0	0.02-0.05	3.6-6.0	<2	Low--------	0.10			
Millhopper-------	0-50	2-8	1.50-1.67	6.0-20	0.05-0.10	4.5-6.5	<2	Low--------	0.10	5	2	.5-2
	50-80	12-28	1.80-1.90	0.06-2.0	0.08-0.15	4.5-6.0	<2	Low--------	0.28			
33--------------- Terra Ceia	0-80	---	0.15-0.35	6.0-20	0.30-0.50	4.5-8.4	<2	Low--------	----	2	2	>60
34. Urban land												
35--------------- Wabasso	0-4	1-5	1.25-1.45	6.0-20	0.03-0.08	3.6-6.5	<2	Low--------	0.10	5	2	1-4
	4-18	0-5	1.35-1.55	6.0-20	0.02-0.05	3.6-6.5	<2	Low--------	0.10			
	18-25	1-12	1.50-1.75	0.6-2.0	0.10-0.15	4.5-7.3	<2	Low--------	0.15			
	25-27	2-5	1.40-1.55	6.0-20	0.02-0.05	5.1-8.4	<2	Low--------	0.10			
	27-70	12-30	1.60-1.75	<0.2	0.10-0.15	5.1-8.4	<2	Low--------	0.24			
	70-80	2-12	1.40-1.70	6.0-20	0.05-0.10	7.4-8.4	<2	Low--------	0.10			

TABLE 15.--SOIL AND WATER FEATURES

["Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated]

Map symbol and soil name	Hydro-logic group	Flooding			High water table			Subsidence		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Initial	Total	Uncoated steel	Concrete
					Ft			In	In		
2:											
Adamsville	C	None	---	---	2.0-3.5	Apparent	Jun-Nov	---	---	Low	Moderate.
Sparr	C	None	---	---	1.5-3.5	Apparent	Jun-Nov	---	---	Moderate	High.
3 Arents	C	None	---	---	1.5-3.0	Apparent	Jun-Nov	---	---	High	Moderate.
4, 5 Astatula	A	None	---	---	>6.0	---	---	---	---	Low	High.
6, 7, 8:											
Astatula	A	None	---	---	>6.0	---	---	---	---	Low	High.
Apopka	A	None	---	---	>6.0	---	---	---	---	Moderate	High.
9:											
Basinger	B/D	None	---	---	0-1.0	Apparent	Jun-Feb	---	---	High	Moderate.
Delray	B/D	None	---	---	0-1.0	Apparent	Jun-Mar	---	---	Moderate	Low.
10:											
Basinger	D	None	---	---	+2-0	Apparent	Jun-Feb	---	---	High	Moderate.
Samsula	B/D	None	---	---	+2-0	Apparent	Jan-Dec	16-20	30-36	High	High.
Hontoon	B/D	None	---	---	+2-0	Apparent	Jan-Dec	16-24	>52	High	High.
11:											
Basinger	D	None	---	---	+2-0	Apparent	Jun-Feb	---	---	High	Moderate.
Smyrna	D	None	---	---	+2-0	Apparent	Jun-Feb	---	---	High	High.
12:											
Canova	B/D	None	---	---	+2-0	Apparent	Jan-Dec	3-6	8-12	High	Low.
Terra Ceia	B/D	None	---	---	+2-0	Apparent	Jan-Dec	16-20	50-60	Moderate	Moderate.
13:											
EauGallie	B/D	None	---	---	0-1.0	Apparent	Jun-Oct	---	---	High	Moderate.
Immokalee	B/D	None	---	---	0-1.0	Apparent	Jun-Oct	---	---	High	High.

TABLE 15.--SOIL AND WATER FEATURES--Continued

Map symbol and soil name	Hydro-logic group	Flooding			High water table			Subsidence		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Initial	Total	Uncoated steel	Concrete
					Ft			In	In		
14: Felda	B/D	Frequent	Brief	Jul-Feb	0-1.0	Apparent	Jul-Mar	---	---	High	High.
15:											
Felda	D	None	---	---	+2-0	Apparent	Jun-Dec	---	---	High	High.
Manatee	D	None	---	---	+2-0	Apparent	Jun-Feb	---	---	High	Low.
16: Immokalee	B/D	None	---	---	0-1.0	Apparent	Jun-Oct	---	---	High	High.
17:											
Brighton	B/D	None	---	---	+2-0	Apparent	Jan-Dec	16-20	50-60	High	High.
Samsula	B/D	None	---	---	+2-0	Apparent	Jan-Dec	16-20	30-36	High	High.
Sanibel	B/D	None	---	---	+2-0	Apparent	Jun-Feb	3-5	5-15	High	Low.
18: Malabar	B/D	None	---	---	0-1.0	Apparent	Jun-Nov	---	---	High	Low.
19:											
Manatee	D	Frequent	Very long	Jun-Feb	0-1.0	Apparent	Jun-Feb	---	---	High	Low.
Floridana	D	Frequent	Very long	Jul-Sep	0-1.0	Apparent	Jun-Feb	---	---	Moderate	Low.
Holopaw	D	Frequent	Very long	Jun-Feb	0-1.0	Apparent	Jun-Feb	---	---	High	High.
20:											
Myakka	B/D	None	---	---	0-1.0	Apparent	Jun-Oct	---	---	High	High.
EauGallie	B/D	None	---	---	0-1.0	Apparent	Jun-Oct	---	---	High	Moderate.
21: Nittaw	D	None	---	---	+2-0	Apparent	Jun-Apr	---	---	High	Moderate.
22: Nittaw	D	Occasional	Very long	Jun-Sep	0-1.0	Apparent	Jun-Nov	---	---	High	High.
23:											
Nittaw	D	Frequent	Very long	Jun-Sep	0-1.0	Apparent	Jun-Nov	---	---	High	High.
Okeelanta	D	Frequent	Very long	Mar-Sep	0-1.0	Apparent	Jan-Dec	4-8	10-18	High	Moderate.
Basinger	D	Frequent	Long	Jul-Sep	0-1.0	Apparent	Jun-Nov	---	---	High	Moderate.

TABLE 15.--SOIL AND WATER FEATURES--Continued

Map symbol and soil name	Hydro-logic group	Flooding			High water table			Subsidence		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Ini-tial	Total	Uncoated steel	Concrete
					Ft			In	In		
24:											
Paola------------	A	None--------	---	---	>6.0	---	---	---	---	Low------	High.
St. Lucie--------	A	None--------	---	---	>6.0	---	---	---	---	Low------	Moderate.
25---------------- Pineda	B/D	None--------	---	---	0-1.0	Apparent	Jun-Nov	---	---	High-----	Low.
26. Udorthents											
27---------------- Pomello	C	None--------	---	---	2.0-3.5	Apparent	Jul-Nov	---	---	Low------	High.
28---------------- Pompano	D	Occasional	Brief-----	Jun-Nov	0-1.0	Apparent	Jun-Nov	---	---	High-----	Moderate.
29:											
St. Johns--------	B/D	None--------	---	---	0-1.0	Apparent	Jun-Apr	---	---	High-----	High.
EauGallie--------	B/D	None--------	---	---	0-1.0	Apparent	Jun-Oct	---	---	High-----	Moderate.
30---------------- Seffner	C	None--------	---	---	1.5-3.5	Apparent	Jun-Nov	---	---	Low------	Moderate.
31, 32:											
Tavares----------	A	None--------	---	---	3.5-6.0	Apparent	Jul-Dec	---	---	Low------	High.
Millhopper-------	A	None--------	---	---	3.5-6.0	Perched	Jul-Dec	---	---	Low------	Moderate.
33---------------- Terra Ceia	D	Frequent----	Long------	Jun-Nov	0-1.0	Apparent	Jan-Dec	16-20	50-60	Moderate	Moderate.
34---------------- Urban land	D	None--------	---	---	>2.0	---	---	---	---	---	---
35---------------- Wabasso	B/D	None--------	---	---	0-1.0	Apparent	Jun-Oct	---	---	Moderate	High.

TABLE 16.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Adamsville	Hyperthermic, uncoated Aquic Quartzipsamments
Apopka	Loamy, siliceous, hyperthermic Grossarenic Paleudults
Arents	Arents
Astatula	Hyperthermic, uncoated Typic Quartzipsamments
Basinger	Siliceous, hyperthermic Spodic Psammaquents
Brighton	Dysic, hyperthermic Typic Medihemists
Canova	Fine-loamy, siliceous, hyperthermic Typic Glossaqualfs
Delray	Loamy, siliceous, hyperthermic Grossarenic Argiaquolls
EauGallie	Sandy, siliceous, hyperthermic Alfic Haplaquods
Felda	Loamy, siliceous, hyperthermic Arenic Ochraqualfs
Floridana	Loamy, siliceous, hyperthermic Arenic Argiaquolls
Holopaw	Loamy, siliceous, hyperthermic Grossarenic Ochraqualfs
Hontoon	Dysic, hyperthermic Typic Medisaprists
Immokalee	Sandy, siliceous, hyperthermic Arenic Haplaquods
Malabar	Loamy, siliceous, hyperthermic Grossarenic Ochraqualfs
Manatee	Coarse-loamy, siliceous, hyperthermic Typic Argiaquolls
Millhopper	Loamy, siliceous, hyperthermic Grossarenic Paleudults
Myakka	Sandy, siliceous, hyperthermic Aeric Haplaquods
Nittaw	Fine, montmorillonitic, hyperthermic Typic Argiaquolls
Okeelanta	Sandy or sandy-skeletal, siliceous, euic, hyperthermic Terric Medisaprists
Paola	Hyperthermic, uncoated Spodic Quartzipsamments
Pineda	Loamy, siliceous, hyperthermic Arenic Glossaqualfs
Pomello	Sandy, siliceous, hyperthermic Arenic Haplohumods
Pompano	Siliceous, hyperthermic Typic Psammaquents
Samsula	Sandy or sandy-skeletal, siliceous, dysic, hyperthermic Terric Medisaprists
Sanibel	Sandy, siliceous, hyperthermic Histic Humaquepts
Seffner	Sandy, siliceous, hyperthermic Quartzipsammentic Haplumbrepts
Smyrna	Sandy, siliceous, hyperthermic Aeric Haplaquods
Sparr	Loamy, siliceous, hyperthermic Grossarenic Paleudults
St. Johns	Sandy, siliceous, hyperthermic Typic Haplaquods
St. Lucie	Hyperthermic, uncoated Typic Quartzipsamments
Tavares	Hyperthermic, uncoated Typic Quartzipsamments
Terra Ceia	Euic, hyperthermic Typic Medisaprists
Udorthents	Udorthents
Wabasso	Sandy, siliceous, hyperthermic Alfic Haplaquods

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